Workshop Manual

SpaceFox, Space Cross, Suran, Suran Cross, Sportvan 2006 ➢

Brake systems

Edition 05.2011

List of Workshop Manual Repair Groups

Repair Group

00 - Technical data

45 - Anti-lock Braking System (ABS)

46 - Brakes - Mechanical system

47 - Brakes - Hydraulic system, servo brake

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – Technical data

1 Technical data

1.1 Brake PR number correspondence

Information about which brake is installed in a vehicle is on the vehicle identification label with its respective PR number.

Example of a vehicle identification label

In this example, the following brake is installed in the vehicle:

- -1- Rear wheel brake (-1KM-Drum brake).
- -2- Front wheel brake with bracket (-1LR-Disc Brake FS III).

The vehicle ID label is located in the spare wheel housing and in the Maintenance and Warranty book.

The following table displays the PR number coding. This is important for the combination caliper/disc/drum and brake pads/ linings.

- Allocation ⇒ Electronic Parts Catalogue (ETKA)

1.1.1 Front wheel brake

PR number	Front wheel brake
1LM / 1LA / 1ZN	FS II (13")
1LG / 1ZF / 1ZR/1LR	FS III (14")
1LD	FS III (15")

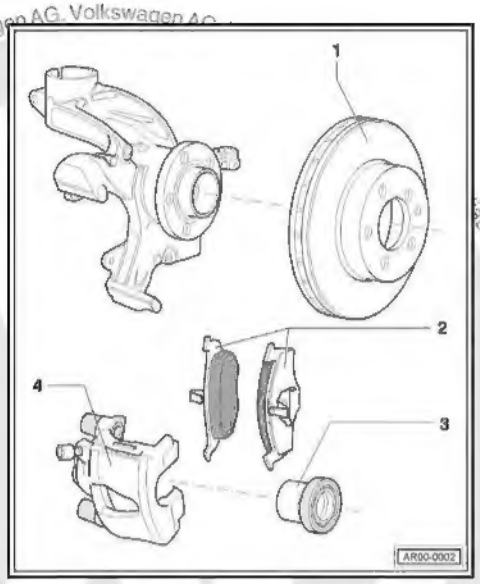
1.1.2 Rear wheel brake (drum brake)

PR number	Rear wheel brake
1KB	TB 200 X 40 CR 17 mm
1KM	TB 200 X 40 CR 19mm

1.2 Brake technical data

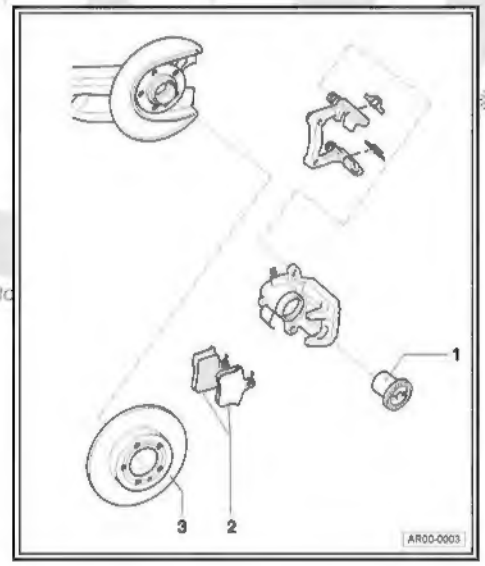
1.2.1 Front wheel brake FS III

	PR number		1LD
	Brake cylinder	∅ mm	20,64
	Servo brake	∅ pol	8,544"
-1-	Brake disc	∅ mm	256
	Brake disc, thickness	mm	22
-2-	Brake pad, thickness	mm	14,17
-3-	Brake caliper, plunger	∅ mm	54
-4-	Brake caliper		FS III (15")



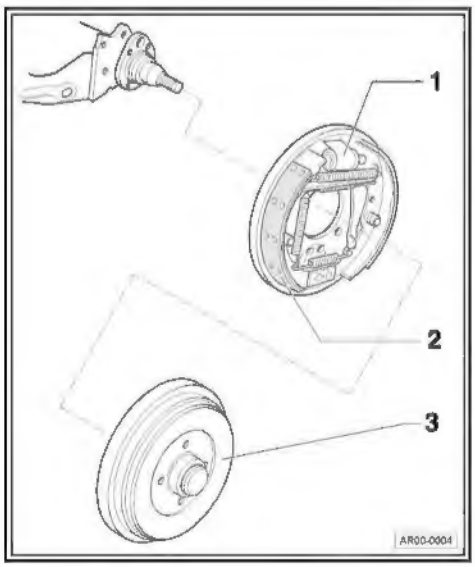
1.2.2 Rear wheel brake (drum brake, without ABS)

	PR number		1KM
	Brake cylinder	∅ mm	20,64
	Servo brake	∅ pol	8,5"
-1-	Wheel brake cylinder	∅ mm	17,46
-2-	Brake pad, thickness	mm	5
	Brake pad, width	mm	38.8
-3-	Brake drum	∅ mm	200



1.2.3 Rear wheel brake (drum brake, with ABS)

	PR number		1KM
	Brake cylinder	∅ mm	20,64
	Servo brake	∅ pol	8,544"
-1-	Wheel brake cylinder	∅ mm	17,46
-2-	Brake pad, thickness	mm	5
	Brake pad, width	mm	38,8
-3-	Brake drum	∅ mm	200



45 – Anti-lock Braking System (ABS)

1 Information on repair works on the ABS

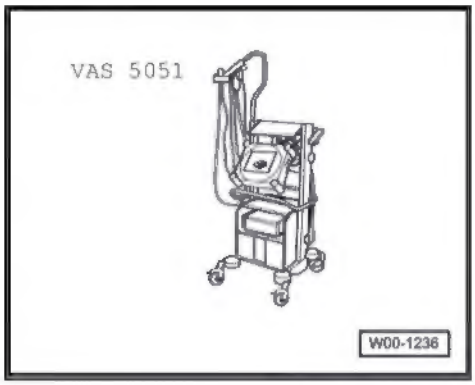
Before repairing the antilock braking system, determine the cause of the damage with the aid of "Assisted troubleshooting" effected with the aid of Diagnosis, Measurement and Information System -VAS 5051A/52- .

- With the ignition turned off, disconnect the battery earth strap.
- Prior welding with the electrical welding equipment
- Observe the effective measures and notes when handing the brake fluid, ⇒ page 85
- After service requiring opening of the break system, bleed the brake system with the Brake filling and bleeding equipment -VAS 5234- or the Brake pedal compression device -VAG 1869- , ⇒ page 85
- During the test drive, ensure at least one brake adjustment is performed (a slight pulsing on the brake pedal shall be felt).
- While working on the ABS system, a high level of cleanliness must be maintained, and under no circumstances, materials containing mineral oil, such as, for example, oils, grease, etc. can be used.
- Carefully clean the union areas and surrounding surfaces before disassembling them, however, no cleaning products should be used, such as brake cleaning products, gasoline, solvents, or similar products.
- The components removed must be placed on a clean surface and covered over.
- If the repairs are not carried out immediately, carefully cover the open components or place them in the proper location. (Use the lid from repair set 1H0 698 311 A)
- Use cloths that do not fray.
- Only remove the replacement parts from their packages immediately before assembly.
- Use only parts in original packaging.
- Do not work with compressed air nor move the vehicle with the system open.
- Make sure that no brake fluid comes into contact with the connectors.
- For painting jobs, the command unit may be momentaneously submitted to a maximum temperature of 95 °C, and for longer periods (about 2 hours) with max. 85 °C.

2 Connect the Diagnosis, Measurement and Information System -VAS 5051A/52- and select the functions

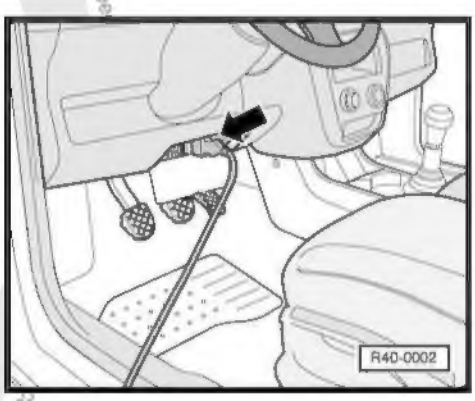
Special tools and workshop equipment required

- Diagnosis, Measurement and Information System -VAS 5051A/52-
- Diagnostic cable -VAS 5051/1- or Diagnostic cable -VAS 5051/3-

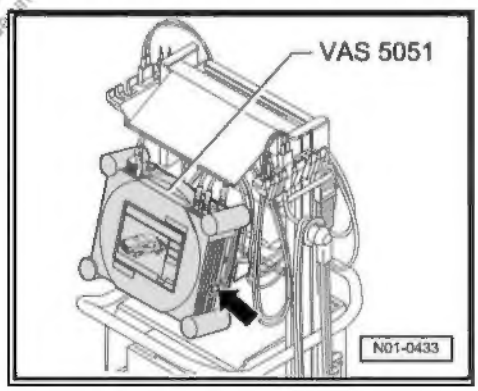


> **WARNING**
>
> - *During a test drive, the measuring and checking equipment must always be fastened to the rear seat of the vehicle.*
> - *During a test drive, only one person should operate this equipment.*

– Connect the diagnostic cable connector Diagnostic cable -VAS 5051/1- or the Diagnostic cable -VAS 5051/3- to the diagnostic connection -arrow-.



– Connect the Diagnosis, Measurement and Information System -VAS 5051A/52- , and follow the instructions on the screen.



3 General information on the Bosch 5.7 antilock braking system (ABS)

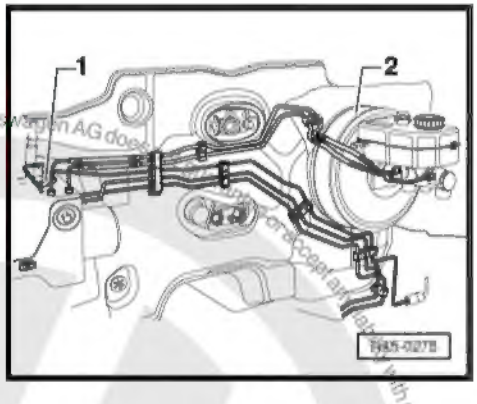
The ABS brake system is arranged diagonally. The braking power amplification is carried out pneumatically through the vacuum servo brake.

Failures on the ABS do not influence the brake system and the servo brake. The conventional braking system remains functional even without the ABS. Expect an alteration on the brake system operation. After the ABS control lamp lights up, the rear wheels may lock in advance!

In case there are any complaints, the hydraulic and control units shall be replaced together.

Remove and install the control and hydraulic unit ⇒ page 15 .

ABS Location:



1 - Hydraulic unit and control unit

2 - Servo brake

4 General information on the Bosch 8.0 antilock braking system (ABS)

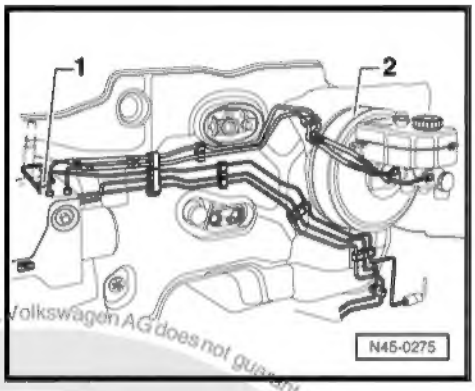
ABS Bosch 8.0 had the following variants:

- ABS
- ABS/EDS/ASR/ESP

The ABS brake system is arranged diagonally. The braking power amplification is carried out pneumatically through the vacuum servo brake.

Failures on the ABS do not influence the brake system and the servo brake. The conventional braking system remains functional even without the ABS. Expect an alteration on the brake system operation. After the ABS control lamp lights up, the rear wheels may lock in advance!

Location of the ABS in vehicles with steering wheel on the left side:

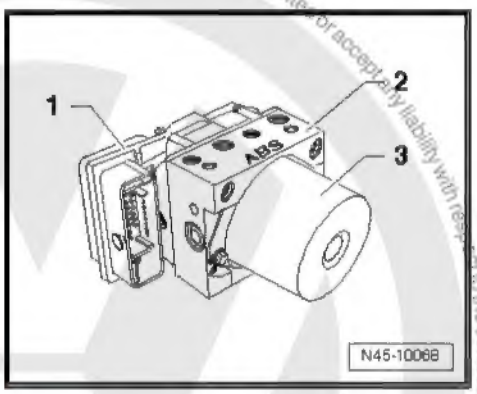


1 - Hydraulic unit and control unit

2 - Servo brake

The control unit -1- and the hydraulic unit -2- comprise a unit. In case of damage, replace the control unit and the hydraulic unit as a set. It is not allowed the separation of the pump -3- from the hydraulic unit.

Bosch 8.0 ABS and ABS/ASR:



Hydraulic unit and control unit ⇒ page 23 .

5 General information on the Bosch 8.2 antilock braking system (ABS)

The ABS brake system (Bosch 8.2) is arranged diagonally. The braking power amplification is carried out pneumatically through the vacuum servo brake.

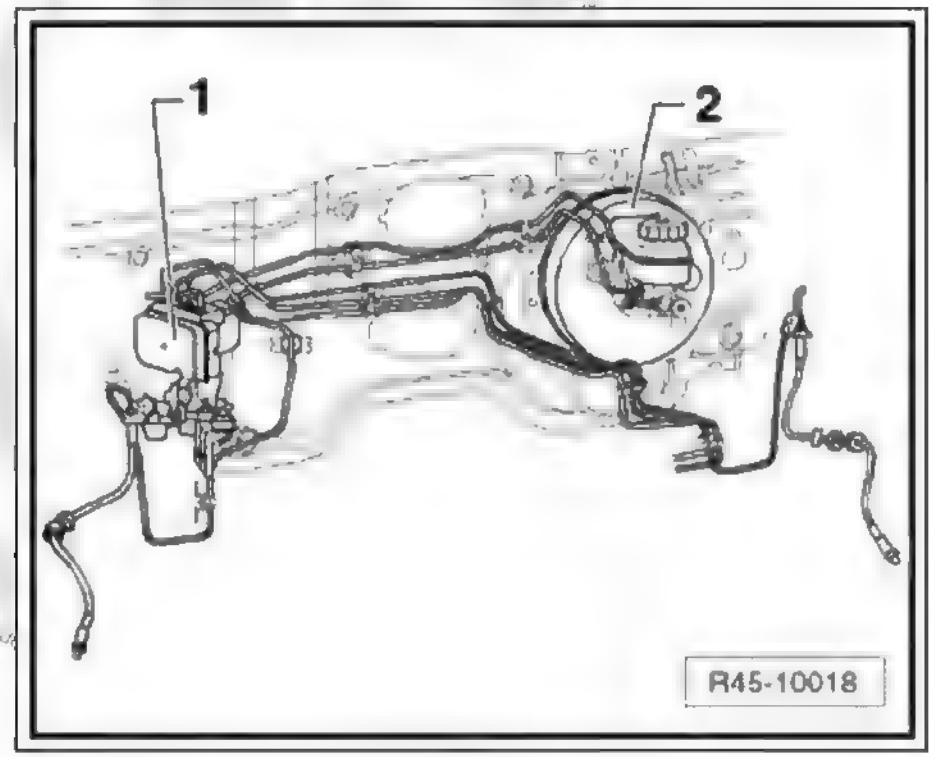
Note

Failures in the ABS do not influence the brake system and the servo brake. The conventional braking system remains functional even without the ABS. A difference in the behavior of the brake system is to be expected. After the ABS control lamp lights up, the rear wheels may lock early!

ABS location:

1 - Hydraulic system unit and ABS command device

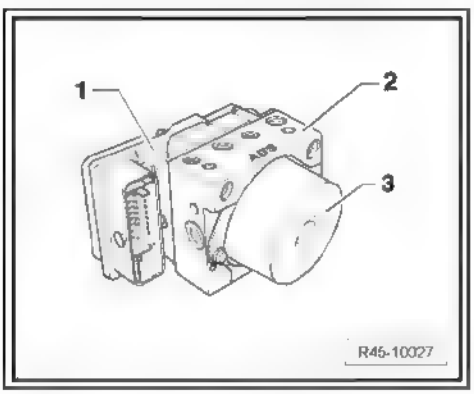
2 - Servo brake



Bosch 8.2 (ABS) :

Command device -1- and hydraulic system unit -2- comprise a unit. In case of damage, replace both the command device and hydraulic system unit. Do not separate the hydraulic pump -3- from the hydraulic system unit.

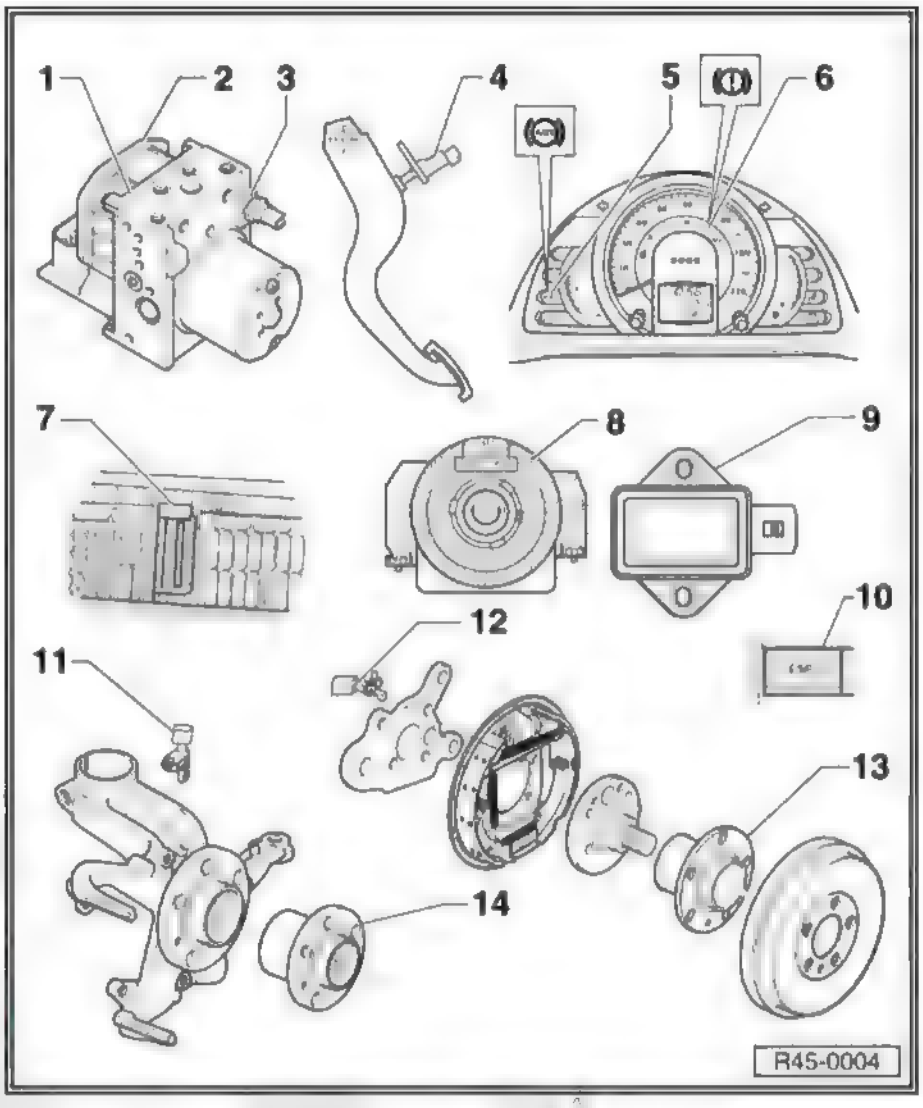
ABS hydraulic unit -N55- and ABS control unit -J104-
➢ page 10 .



6 Electrical/electronic components and installing locations

6.1 ABS Bosch 5.7

up to the model 2011



1 - ABS hydraulic unit -N55-

The hydraulic unit comprises the following components:

- ABS reflux pump -V39-
- Valve block (includes intake and exhaust valves)
- A ABS reflux pump -V39- and the valve block must not be separated
- Remove and install ⇒ page 15

2 - ABS control unit -J104-

- Do not disconnect the control unit connector before self-diagnosis
- Remove and install ⇒ page 15

3 - Brake pressure Sensor 1 -G201-

- Remove and install ⇒ page 21

4 - Brake light switch -F- and Brake pedal switch -F47-

- Adjust ⇒ page 74

5 - ABS control light -K47-

- Installation location: on the instrument panel
- Function: ⇒ page 34

6 - Brake system control light -K118-

- Installation location: on the instrument panel
- Function: ⇒ page 34

7 - Diagnosis connection

- Installation location: footwell lining on the driver's side

8 - Steering angle sensor -G85-

- Installation location: at the steering column between the steering wheel and the steering column switch

9 - Lateral acceleration sensor -G200- and Lateral tilting intensity sensor -G202-

- Installation location: at the left seat transverse bracket on the floor plate

10 - ESP button

- Installation location: if there is any, on the instrument panel

11 - Front right wheel rotation sensor -G45- and Left front wheel rotation sensor -G47-

- ❑ Replace ⇒ page 36

12 - Rear right wheel rotation sensor -G44- and Left rear wheel rotation sensor -G46-

- ❑ Replace ⇒ page 36

13 - Wheel hub/roller bearing assembly

- ❑ The ABS sensor ring is assembled to the wheel bearing

14 - Wheel hub/roller bearing assembly

- ❑ The ABS sensor ring is assembled to the wheel bearing

6.2 ABS Bosch 8.0 (ABS/ESP)

up to the model 2011

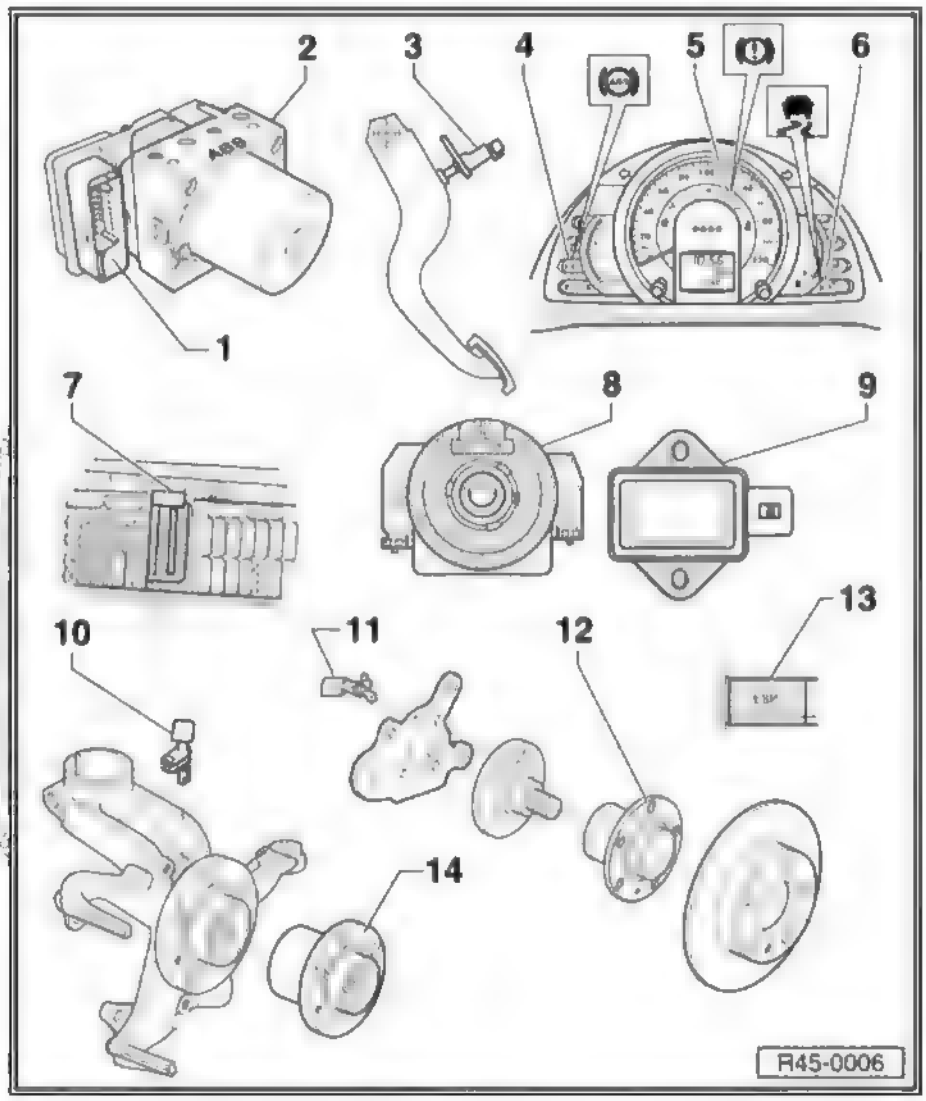
1 - ABS control unit -J104-

- ❑ It can be checked in the function "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- ❑ Do not disconnect the connector for the command unit before the self-diagnosis
- ❑ Remove and install ⇒ page 25

2 - ABS hydraulic unit -N55-

The hydraulic unit comprises the following components:

- ❑ ABS reflux pump -V39-
- ❑ It can be checked in the function "Assisted Troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- ❑ Valve block (includes intake and exhaust valves)
- ❑ A ABS reflux pump -V39- and the valves may not be separated.
- ❑ Remove and install ⇒ page 25 .



3 - Brake light switch -F- or Brake pedal switch -F47-

- ❑ Remove and install ⇒ page 74 .

4 - ABS control light -K47-

- ❑ Installation location: of the instrument panel.

Function: ⇒ page 34 .

5 - Brake system control light -K118-

- ❑ Installation location: of the instrument panel.

Function: ⇒ page 34 .

6 - ESP and ASR control light -K155-

- Installation location: of the instrument panel.

Function: ⇒ page 34 .

7 - Diagnosis connector

- Installation location: Next to the fuse box, under the steering column

8 - Steering angle sensor -G85-

- It may be checked by the "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Installation location: at the steering column between the steering wheel and the steering column switch.
- Observe the assembly procedure.

⇒ page 46 .

9 - Lateral acceleration sensor -G200- and Lateral tilting intensity sensor -G202-

- It can be checked in the function "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Packed in a case.
- Installation location: at the left seat crossmember, on the floor plate.
- Follow assembly procedures
- Remove and install ⇒ page 45 .

10 - Front right wheel rotation sensor -G45- / Left front wheel rotation sensor -G47-

- It may be checked by the "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Replace ⇒ page 36 .

11 - Rear right wheel rotation sensor -G44- / Left rear wheel rotation sensor -G46-

- It may be checked by the "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Replace ⇒ page 42 .

12 - Wheel hub/roller bearing assembly

- The ABS sensor ring is assembled to the wheel bearing.

13 - Switch for the ASR / ESP electronic stability program -E256-

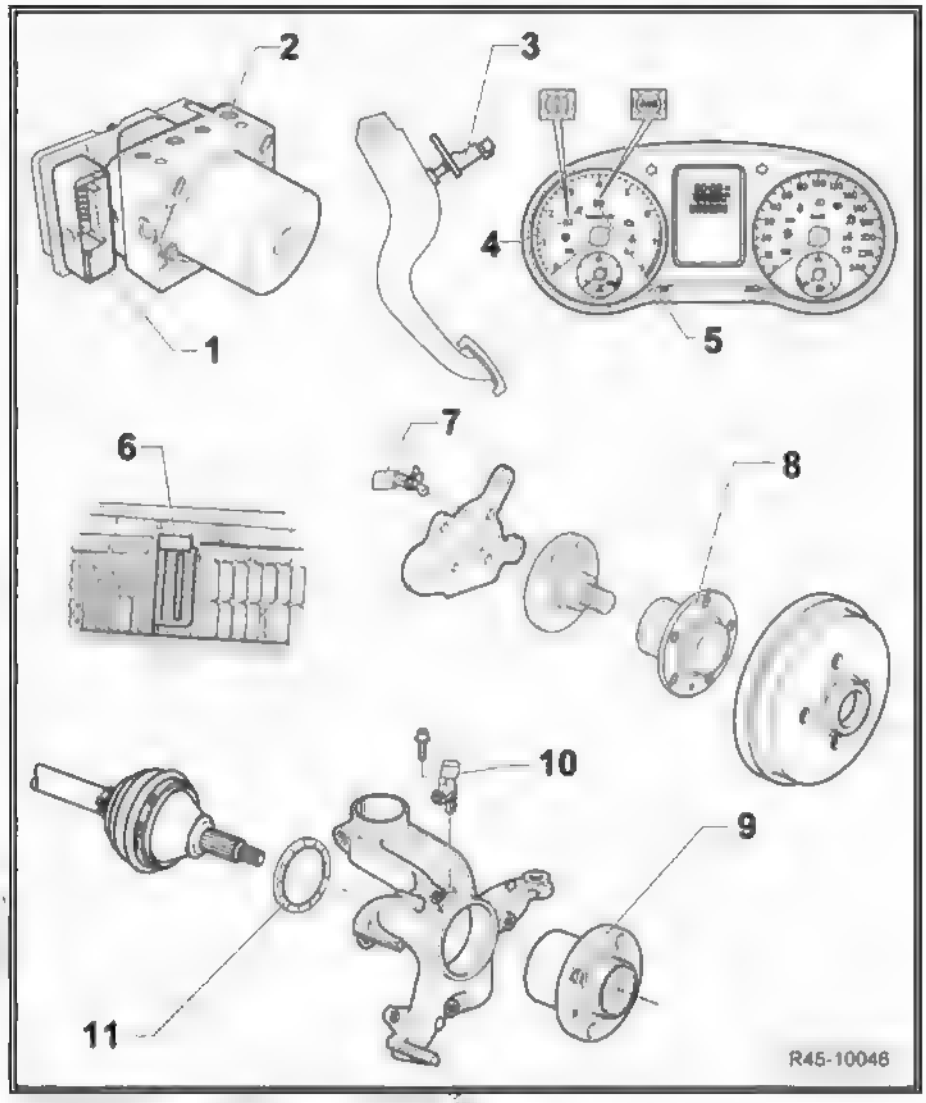
- Installation location: of the instrument panel.

14 - Wheel hub/roller bearing assembly

- The ABS sensor ring is assembled to the wheel bearing.

6.3 ABS Bosch 8.2

As from model-year 2011



1 - ABS control unit -J104-

- It can be checked in the function "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Do not disconnect the connector for the command unit before the self-diagnosis
- Remove and install ⇒ page 25 .

2 - ABS hydraulic unit -N55-

The hydraulic unit comprises the following components:

- ABS reflux pump -V39-
- It can be checked in the function "Assisted Troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Valve block (includes intake and exhaust valves)
- A ABS reflux pump -V39- and the valves may not be separated
- Remove and install ⇒ page 25

3 - Brake light switch -F- or Brake pedal switch -F47-

- Remove and install ⇒ page 74 .

4 - Brake system control light -K118-

- Installation location: on the instrument panel

Function: ⇒ page 34 .

5 - ABS control light -K47-

- Installation location: of the instrument panel.

Function: ⇒ page 34 .

6 - Diagnosis connector

- Installation location. Next to the fuse box, under the steering column

7 - Rear right wheel rotation sensor -G44- / Left rear wheel rotation sensor -G46-

- It may be checked by the "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- Replace ⇒ page 42 .

8 - Rear wheel hub/roller bearing set

- The ABS sensor ring is assembled to the wheel bearing.

9 - Front wheel hub/roller bearing set

- The ABS sensor ring is assembled to the wheel bearing

10 - Front right wheel rotation sensor -G45- / Left front wheel rotation sensor -G47-

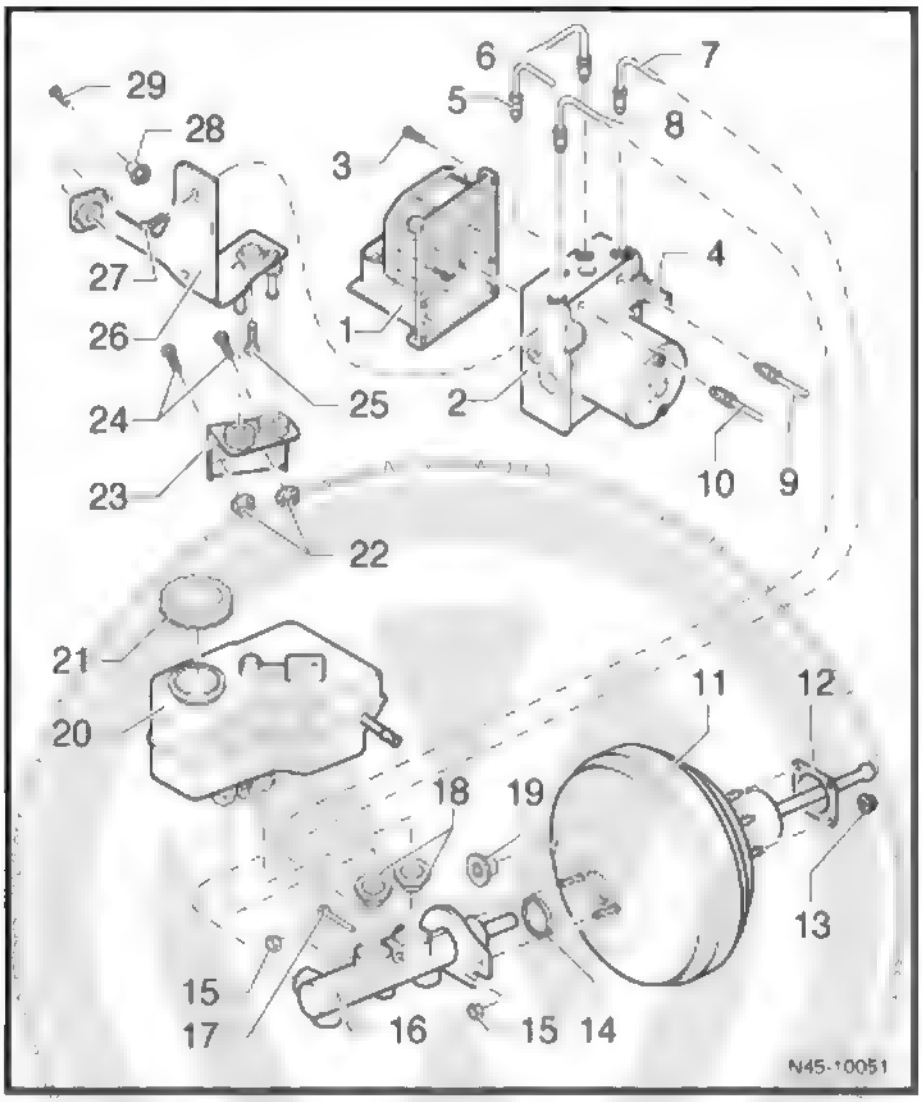
- ❑ It may be checked by the "Assisted troubleshooting" with Diagnosis, Measurement and Information System -VAS 5051A/52-
- ❑ Replace ➔ page 36 .

11 - Centrifuging disc

- ❑ Only for vehicles with ABS brake.

7 Hydraulic unit, servo brake/master cylinder - Bosch 5.7 (up to model 2011) - Assembly overview

The brake cylinder and the servo brake may be independently replaced.



1 - ABS control unit -J104-
- ❑ Remove and install ⇒ page 15

2 - ABS hydraulic unit -N55-
- ❑ The following components are checked in the hydraulic unit ABS hydraulic pump -V64- and the inlet and exhaust valves through self-diagnosis
- ❑ A ABS hydraulic pump -V64- and the valve block may not be separated
- ❑ Remove and install ⇒ page 15

3 - Screw
- ❑ 3 Nm

4 - Brake pressure Sensor 1 -G201-
- ❑ Remove and install ⇒ page 21

5 - Brake pipe connection
- ❑ Hydraulic unit to to left front brake caliper
- ❑ Identification in the hydraulic unit "VL"

6 - Brake pipe connection
- ❑ Hydraulic unit to right front brake caliper
- ❑ Identification in the hydraulic unit "VR"

7 - Brake pipe connection
- ❑ Brake master cylinder/floating plunger circuit to the hydraulic unit
- ❑ Identification in the hydraulic unit "HZ2"

8 - Brake pipe connection
- ❑ Brake master-cylinder/pressure plunger circuit to the hydraulic unit
- ❑ Identification in the hydraulic unit "HZ1"

9 - Brake pipe connection
- ❑ For the left rear brake caliper
- ❑ Identification in the hydraulic unit "HL"

10 - Brake pipe connection
- ❑ For the right rear brake caliper
- ❑ Identification in the hydraulic unit "HR"

11 - Servo brake
- ❑ On gasoline engines, the required vacuum is taken from the intake manifold
- ❑ On ??diesel engines, there is a vacuum pump for vacuum transformation
- ❑ Check the operation:
  - Fully press the brake pedal several times with the engine turned off (this eliminates any remaining vacuum inside the servo-brake).
  - Hold the brake pedal with average strength at braking position and turn the engine on. A fully operational servo brake may be sensed when the operator's feet is on the pedal (active multiplication).
  - In case of faults, completely replace the servo brake.
- ❑ Verify the check valve (in the vacuum hose) ⇒ page 91
- ❑ Remove and install ⇒ page 94

12 - Sealing
- ❑ To servo-brake

13 - Hexagon nut
- ❑ Self-locking
- ❑ 28 Nm

14 - Seal ring
- ❑ Replace whenever the master cylinder is removed

15 - Hexagon nut
- ❑ Self-locking
- ❑ 20 Nm

16 - Brake cylinder
- ❑ Cannot be repaired. In case of fault, replace it completely
- ❑ Remove and install ⇒ page 92

17 - Retaining pin for the brake fluid reservoir
- ❑ Insert through the brake master cylinder

18 - Sealing plug
- ❑ Moist with brake fluid and press into the brake master cylinder

19 - Sealing plug
- ❑ Connection for vacuum hose

20 - Brake fluid reservoir

21 - Cover

22 - Hexagon nut
- ❑ Self-locking
- ❑ 20 Nm

23 - Support

24 - Stud
- ❑ Welded to body

25 - Screw
- ❑ 8 Nm

26 - Support

27 - Screw
- ❑ 8 Nm

28 - Hexagon nut
- ❑ Self-locking

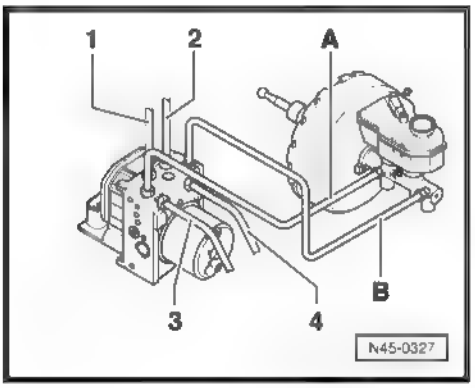
❑ 20 Nm

29 - Stud

❑ Welded to body

7.1 Hydraulic unit connections

7.1.1 Connect the brake pipes for the brake cylinder pipes (Tandem) to the hydraulic unit



A - Hydraulic unit to the brake cylinder pressure plunger loop

- Identification in the hydraulic unit -HZ1-.

B - Hydraulic unit to the brake cylinder floating pressure plunger loop.

- Identification in the hydraulic unit -HZ2-.

1 - Hydraulic unit for left front brake caliper.

- Identification in the hydraulic unit -VL-.

2 - Hydraulic unit for right front brake caliper.

- Identification in the hydraulic unit -VR-.

3 - Hydraulic unit to right rear brake caliper.

- Identification in the hydraulic unit -HR-.

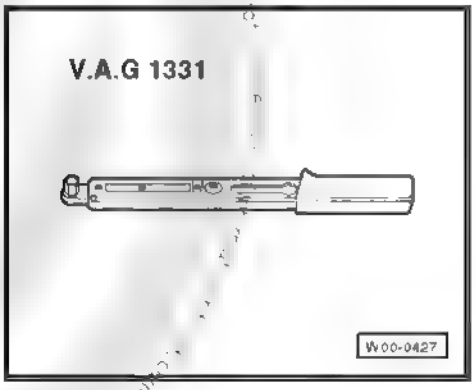
4 - Hydraulic unit to left rear brake caliper.

- Identification in the hydraulic unit -HL-.

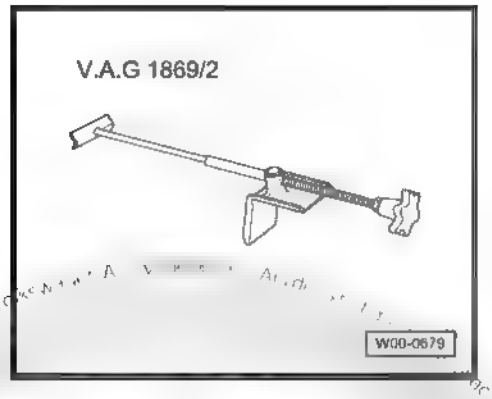
7.2 Control unit and hydraulic unit - remove and install

Special tools and workshop equipment required

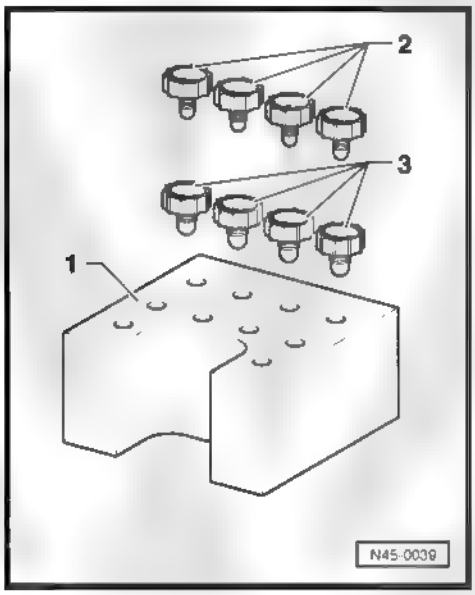
♦ Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-



- Brake pedal actuator -V.A.G 1869/2-



- Repair set of plugs -1H0 698 311 A-



1 - Transport protection for ??valve tubes
2 - Plugs M10
3 - Plugs M12

Note

- *After disconnecting the control unit from the hydraulic unit, always place the transport protection for valve tubes on the hydraulic unit.*
- *Hydraulic unit without transport protection are not covered by warranty.*

7.2.1 Removal

WARNING

Brake piping in the hydraulic unit area shall not be bent!

– Disconnect the battery ⇒ Electrical equipment; Rep. Gr. 27 ; Battery - disconnect and connect

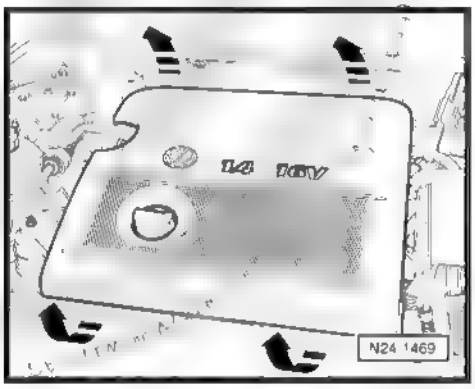
Note

- *Check whether the vehicle has a coded radio. If so, request the anti-theft code before disconnecting the battery earth strap.*
- *When the battery is reconnected, check the operation of the vehicle electrical system (radio, clock and electric door and window locks, etc.) according to the Workshop Manual and/or instructions for use.*

Gasoline engine/Totalflex

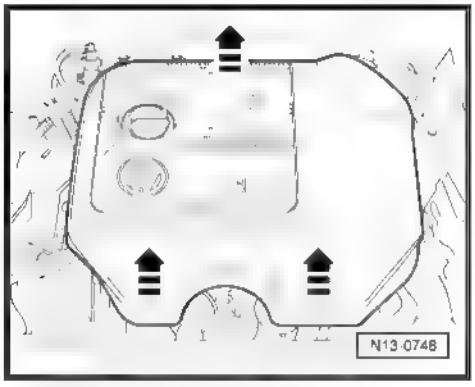
– Pull the hose from the oil separator and the check valve on the upper air filter case section.

– Remove the cover by the points marked with -arrows-.

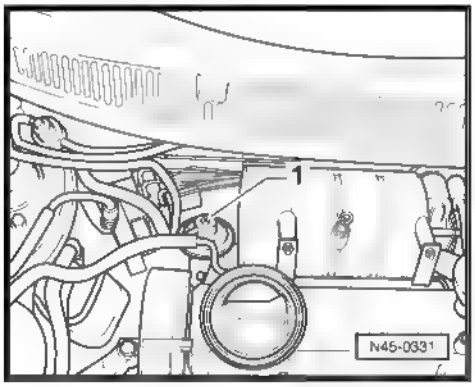


Diesel engine:

– Remove engine bonnet towards the -arrows-.



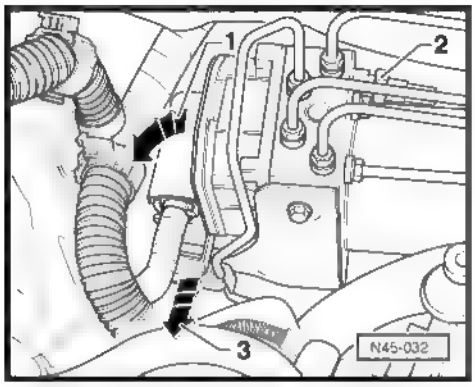
– Remove the escape gas return valve -1-.



Continuation for all vehicles:

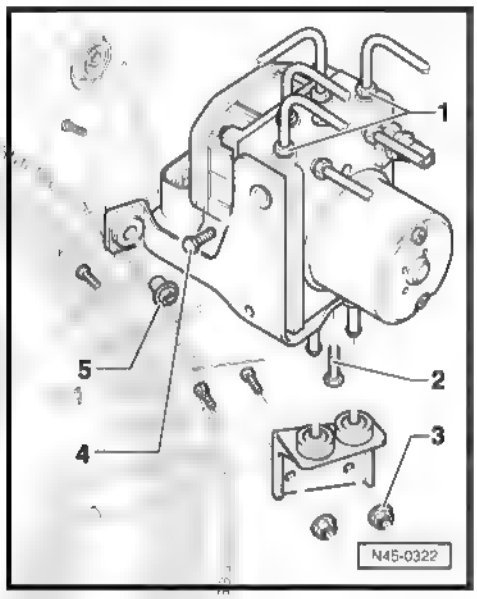
– Disconnect the connector of the Brake pressure Sensor 1 - G201- -2-.

- Unlock -arrow 3- and disconnect -arrow 1- the connector of ABS hydraulic unit -N55- .
- Disconnect the Brake pressure Sensor 1 -G201- -2-.
- Press the brake pedal and install the Brake pedal compression device -VAG 1869/2- .
- Install the bleed hose of the bleed reservoir on the bleed valve of the left front brake caliper and open the valve.
- Close the front left bleed valve.
- Place a proper amount of non-fraying cloth under the control unit and the hydraulic unit.



Watch that no brake fluid reaches the contacts.

- Loosen and hang the hydraulic unit brake pipes -1- to the brake master cylinder.
- Disconnect the remaining brake piping from the hydraulic unit.
- Close the brake tubing and screw holes with the plugs of Repair set of plugs -1H0 698 311 A- .
- Unscrew the hexagonal nuts -3- and -5- from the control unit/ hydraulic unit support.
- Remove the hydraulic unit along with the control unit.
- Unscrew the hexagonal nuts -2- and -4- and remove the control unit/hydraulic unit support.



7.2.2 Installation

Note

Only remove the plugs from the new ABS hydraulic unit -N55- when the respective brake pipe is assembled. If the plugs were already removed from ABS hydraulic unit -N55- , brake fluid may leak to the point that proper ventilation and filling can no longer be guaranteed.

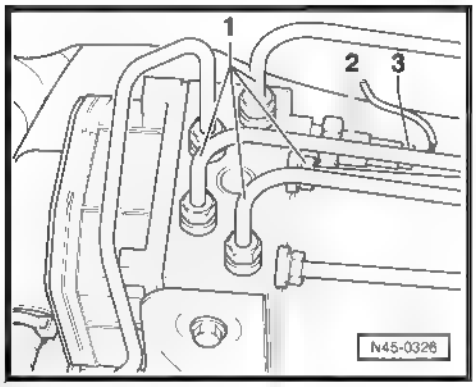
- Install the ABS unit on the support.
- Installation is performed in the reverse sequence of the removal.
- Bleeding brake system ⇒ page 85
- Code the ABS control unit -J104- .

Connect the Diagnosis, Measurement and Information System - VAS 5051A/52- and select the function ⇒ page 4 .

- Code the radio.

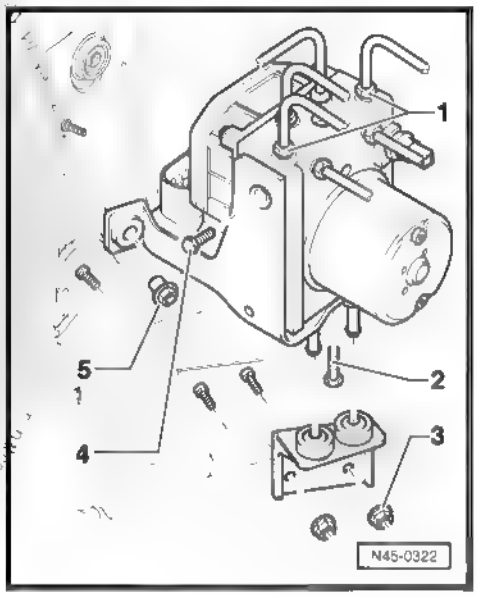
Brake piping tightening torques:

ABS Bosch - (5 7)		
Positions	Component	Torque setting
-1-	Brake piping	14 Nm
-2-	Brake pressure Sensor 1 - G201- .	14 Nm



Tightening torques for fastening the ABS unit and supports:

ABS Bosch - (5.7)		
Positions	Nuts / Screws	Torque setting
-2 / 4-	Screw	8 Nm
-3-	Hexagon nut	20 Nm
-5-	Hexagon nut	20 Nm

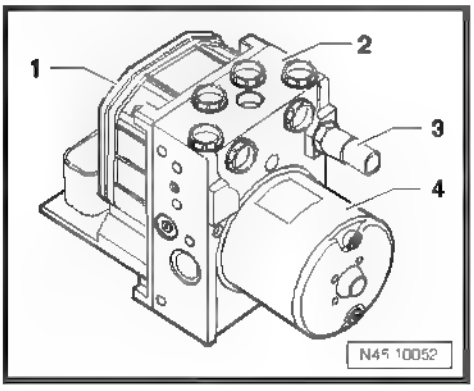


7.3 ABS control unit -J104- from the ABS hydraulic unit -N55- - Remove and install

7.3.1 Removal

Note

- *If the ABS control unit -J104- is damaged, it will be necessary to separate it from ABS hydraulic unit -N55- and merely replace the command unit.*
- *If the ABS hydraulic unit -N55- is damaged, you should replace it with the ABS control unit -J104- .*



ABS Bosch 5.7:

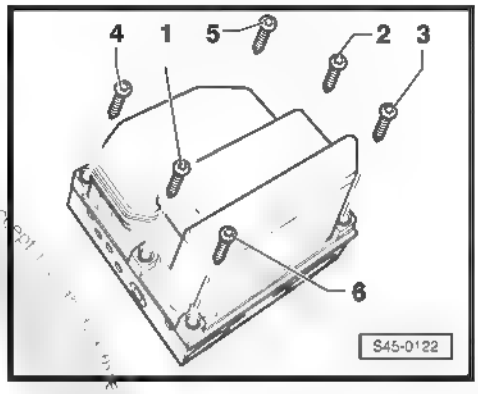
1 - ABS control unit -J104-

2 - ABS hydraulic unit -N55-

3 - Brake pressure Sensor 1 -G201-

4 - ABS reflux pump -V39-

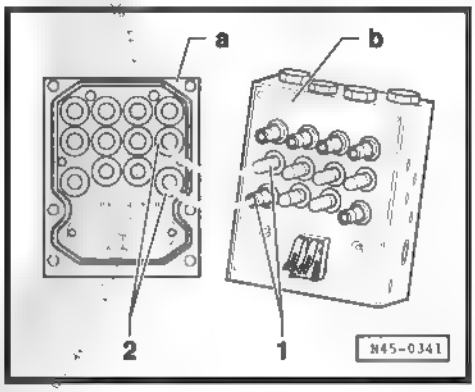
– Remove the external screws -1 - nd -6- from the ABS hydraulic unit -N55-



> **WARNING**
>
> *Torx screws should not be reused.*
>
> *It is forbidden to separate the reflux pump from the hydraulic unit*

– Carefully remove ABS control unit -J104- from the ABS hydraulic unit -N55- , pulling it up.

When removing ABS control unit -J104- , ensure that the valve tubes -1- from the ABS hydraulic unit -N55- -b- are not folded together with electromagnetic coils -2- from the ABS control unit -J104- -nd-.



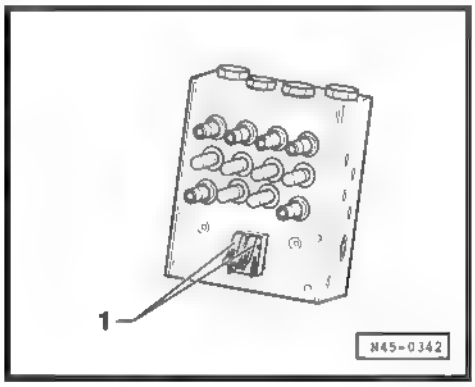
– Cover the electromagnetic coils of the ABS control unit -J104- with a non-fraying cloth.

– Check the sealing surfaces of ABS hydraulic unit -N55- for cleanliness; if necessary, clean with ethyl alcohol using a non-fraying cloth.

While working on the hydraulic system unit sealing surfaces, do not use files, metal scrapers, sandpapers or similar tools.

If the sealing surface of ABS hydraulic unit -N55- is damaged (scratches or signs of wear), replace ABS hydraulic unit -N55- for the brake system.

– Check the contact springs -1- from the ABS hydraulic unit -N55- (ABS reflux pump -V39-) for possible burned and rusty spots.

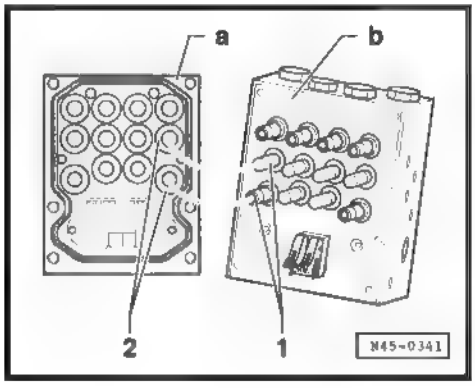


No grinding or cleaning of any kind is allowed on the contact springs, as ABS hydraulic unit -N55- must be replaced together with ABS control unit -J104- .

– Protect the ABS hydraulic unit -N55- when open, against damage to the valve tubes, and cover it with a non-fraying cloth.

7.3.2 Installation

When installing ABS control unit -J104- -nd- on the ABS hydraulic unit -N55- -b-, ensure that the valve tubes -1- are not folded together with electromagnetic coils -2-.



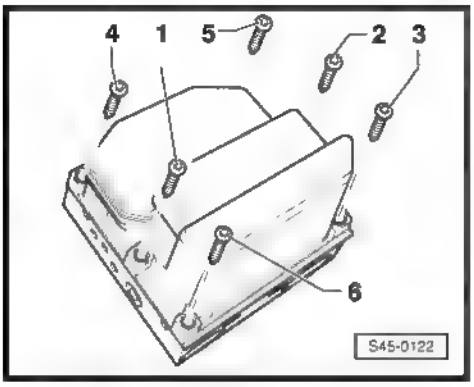
– Install ABS control unit -J104- on the ABS hydraulic unit -N55- .

– Press ABS control unit -J104- onto the seating surface of ABS hydraulic unit -N55- until it engages fully onto the rib on ABS hydraulic unit -N55- and maintain this position.

– Tighten the center screws, working alternately -1- and -2- until attaching the ABS control unit -J104- on the ABS hydraulic unit -N55- .

Use the new screws supplied with the set.

– Install the screws -3- nd -6- and tighten the screws until seating the ABS control unit -J104- .



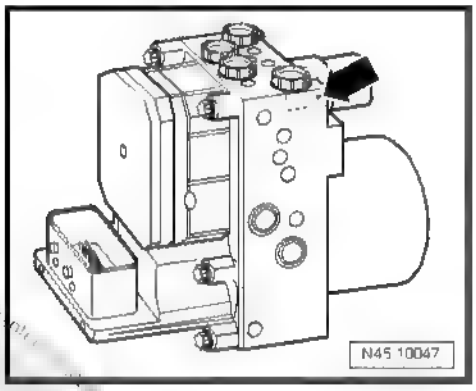
> **WARNING**
>
> *Torx screws should not be reused.*

– Then, alternately tighten the screws

– Tighten the screws in sequence from -1- nd -6- to the specified tightening torque.

The hydraulic unit threads used to fasten the control unit must not be damaged. If the thread is damaged (trouble in tightening the screws manually or screws not tightened to the specified torque), replace ABS hydraulic unit -N55- .

– Identify by striking the traced area -arrow-, each ABS hydraulic unit -N55- on the ABS control unit -J104- .



Note

A ABS hydraulic unit -N55- can only bear 5 assemblies on the ABS control unit -J104- . After 5 assemblies on ABS control unit -J104- it must be replaced.

7.4 Brake pressure Sensor 1 -G201- - remove and install

7.4.1 Removal

– Remove the air cleaner or the engine cover according to the vehicle motorization:

♦ Gasoline engine/Totalflex ⇒ page 17

♦ Diesel engine ⇒ page 17

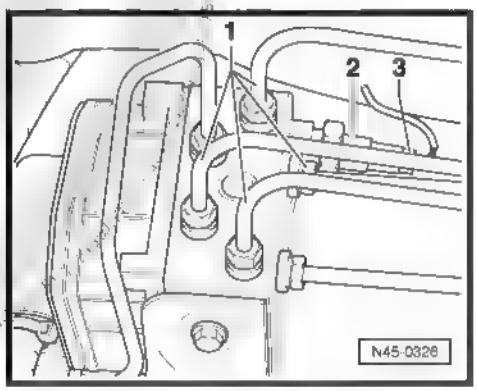
– Pull off connector -3- of Brake pressure Sensor 1 -G201- -2-.

– Place a proper amount of non-fraying cloth under the control unit and the hydraulic unit.

– Release brake pipes -1- from the hydraulic unit.

– Close the brake tubing and screw holes with the plugs of Repair set of plugs 1H0 698 311 A- .

– Remove the Brake pressure Sensor 1 -G201- .



7.4.2 Installation

Install by inverting the removal sequence, paying attention to the following.

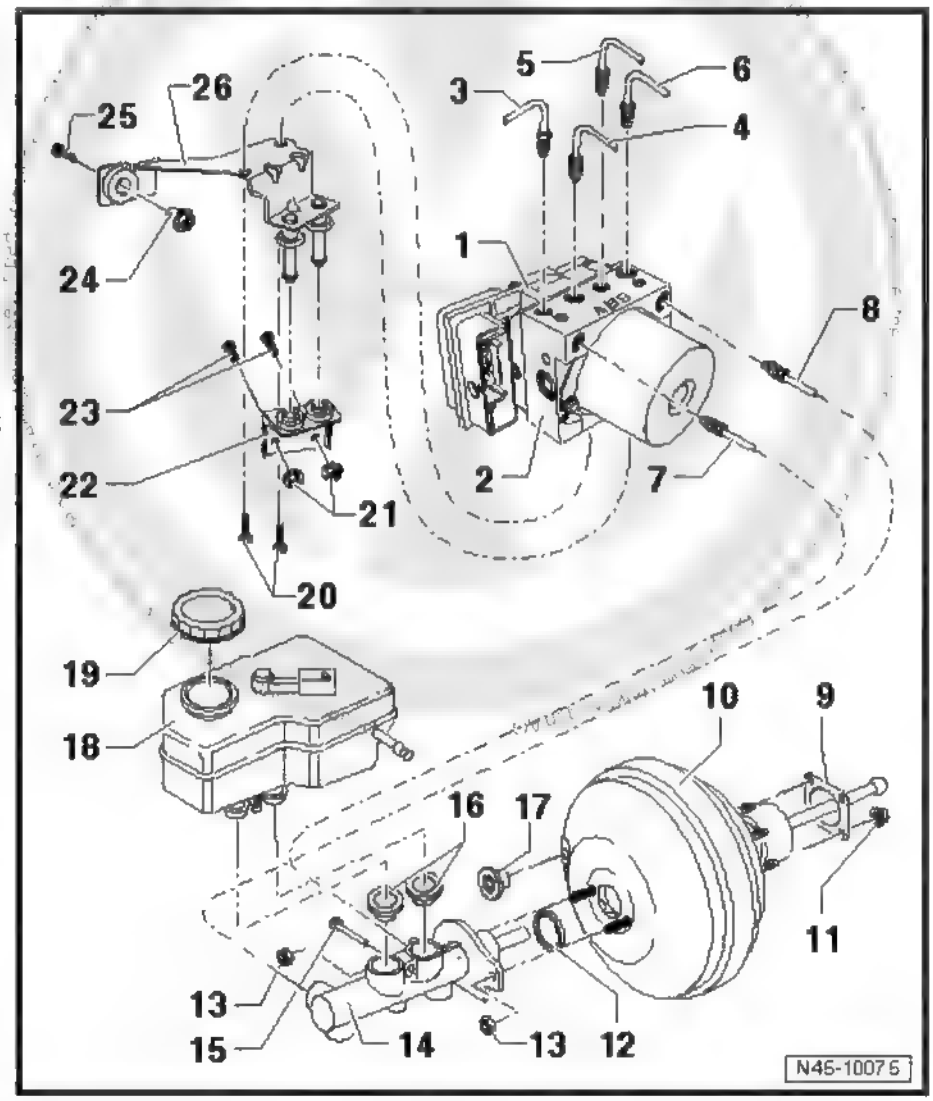
– Bleeding brake system ➔ page 85 .

Tightening torque:	
Brake pressure Sensor 1 -G201-	20 Nm

8 Hydraulic unit, servo brake/brake cylinder - Assembly overview (Bosch 8.0 / 8.2)

The brake cylinder and the servo brake may be independently replaced.

> **WARNING**
>
> *Always replace self-locking nuts and screws which were subjected to angular torque*



1 - ABS control unit -J104-
- Remove and install ABS hydraulic unit -N55- with ABS control unit -J104- ⇒ page 25 .

2 - ABS hydraulic unit -N55-
- A ABS reflux pump - V39- and the coupled valves may not be separated.
- When replacing ABS hydraulic unit -N55- , seal the old part with the plugs from the repair set number ET 1H0 698 311 A.
- Remove and install ABS hydraulic unit -N55- with ABS control unit -J104- ⇒ page 25 .

3 - Brake pipe connection
- Hydraulic unit for right front brake caliper.
- Identification in the hydraulic unit -VR-.

4 - Brake pipe connection
- For the left rear brake caliper.
- Identification in the hydraulic unit -HL-.

5 - Brake pipe connection
- For the right rear brake caliper.
- Identification in the hydraulic unit -HR-.

6 - Brake pipe connection
- Hydraulic unit for left front brake caliper
- Identification in the hydraulic unit -VL-.

7 - Brake cylinder connection
- Brake cylinder/floating plunger loop for the hydraulic unit.
- Identification in the hydraulic unit -HZ1-.

8 - Brake cylinder connection
- ❑ Brake cylinder/floating plunger loop for the hydraulic unit.
- ❑ Identification in the hydraulic unit -HZ2-.

9 - Sealing
- ❑ To the servo brake.

10 - Servo brake
- ❑ On gasoline engines, the vacuum required is removed from the intake manifold.
- ❑ On diesel engines, a vacuum pump is installed to create vacuum.

Operation check:

- Press the brake pedal several times until the end with the engine stopped (This eliminates any remaining vacuum inside the device).
- Now, keep the brake pedal pressed in the braking position with medium force and start the engine. When the servo brake is working properly, this can be felt with your foot on the brake pedal (the amplification is active).

- ❑ In case of faults, replace it completely.
- ❑ Check valve (in the flexible vacuum tube) ⇒ page 91 .
- ❑ Separate the brake pedal ⇒ page 72 .
- ❑ Disassemble and assemble ⇒ page 94 .

11 - Hexagon nut
- ❑ Self-locking
- ❑ Replace
- ❑ 28 Nm

12 - Seal ring
- ❑ Replace

13 - Hexagon nut
- ❑ Self-locking
- ❑ Replace
- ❑ 20 Nm

14 - Brake cylinder
- ❑ Cannot be repaired. In case of fault, replace it completely.
- ❑ Remove and install ⇒ page 92 .

15 - Retaining pin for the brake fluid reservoir
- ❑ Insert through the brake master cylinder.

16 - Sealing plug
- ❑ Moist with brake fluid and press against brake master cylinder.

17 - Sealing plug
- ❑ Connection to flexible vacuum tube.

18 - Brake fluid reservoir

19 - Plug

20 - Screw
- ❑ 8 Nm.

21 - Hexagon nut
- ❑ Self-locking
- ❑ Replace
- ❑ 20 Nm

22 - Support

23 - Stud

- ❑ Stud welded to the body

24 - Hexagon nut

- ❑ Self-locking
- ❑ Replace
- ❑ 20 Nm

25 - Stud

- ❑ Stud welded to the body.

26 - Support

8.1 Hydraulic unit connections

Connect the brake pipes and the brake cylinder pipes to the hydraulic unit:

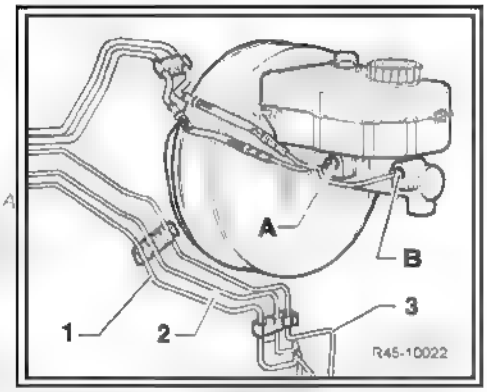
A - Hydraulic unit to the brake cylinder pressure plunger loop(14 Nm).

B - Hydraulic unit to the brake cylinder pressure plunger loop (14 Nm).

1 - Hydraulic unit to right rear brake caliper.

2 - Hydraulic unit to left rear brake caliper.

3 - Hydraulic unit for left front brake caliper.



On the hydraulic system unit:

A - Hydraulic unit to the brake cylinder pressure plunger loop.

- Identification in the hydraulic unit -HZ1-.

B - Hydraulic unit to the brake cylinder floating pressure plunger loop.

- Identification in the hydraulic unit -HZ2-.

1 - Hydraulic unit for right front brake caliper.

- Identification in the hydraulic unit -VR-.

2 - Hydraulic unit to left rear brake caliper.

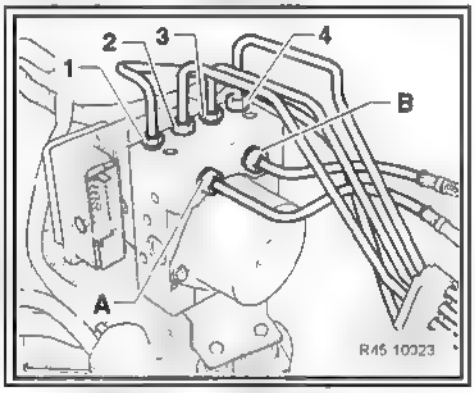
- Identification in the hydraulic unit -HL-.

3 - Hydraulic unit to right rear brake caliper.

- Identification in the hydraulic unit -HR-.

4 - Hydraulic unit for left front brake caliper.

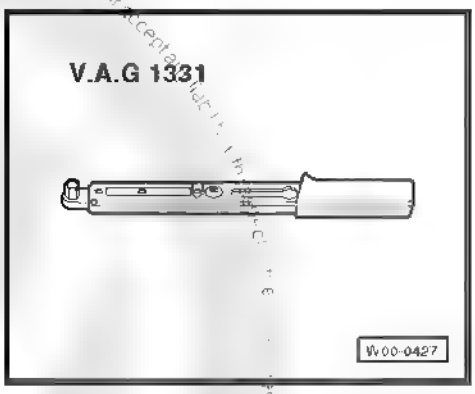
- Identification in the hydraulic unit -VL-



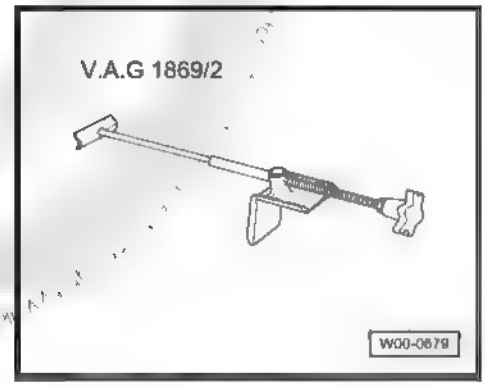
8.2 ABS control unit -J104- on the ABS hydraulic unit -N55- - remove and install

Special tools and workshop equipment required

- "Torque wrench - 5 to 50 Nm (socket 1/2")" -VAG 1331-



- Brake pedal compression device -VAG 1869/2-



Plug repair set 1H0 698 311 A

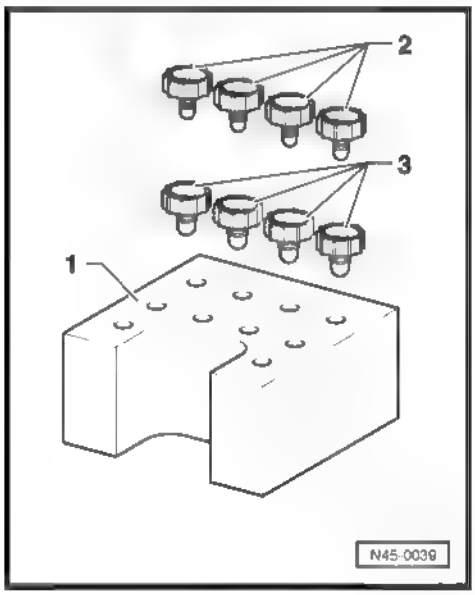
After disconnecting ABS control unit -J104- from the ABS hydraulic unit -N55- , always fit on the hydraulic unit the valve tube transport protection.

Hydraulic unit without the transport protection are not covered by warranty.

1 - Valve tube transport protection.

2 - M 10 Plugs.

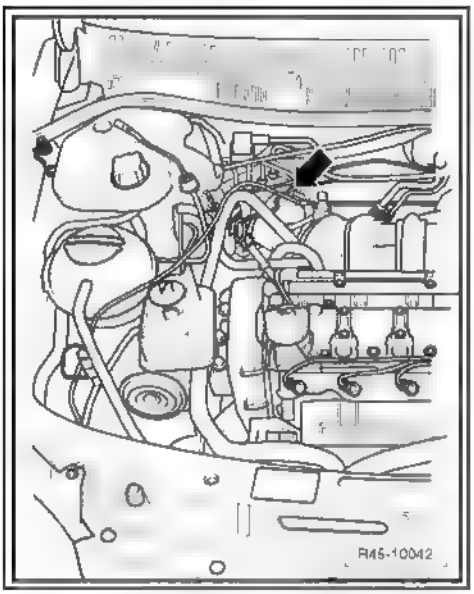
3 - M 12 Plugs.



8.2.1 Remove

Installation location:

A ABS control unit -J104- is fastened to ABS hydraulic unit -N55- and is located in the engine compartment, right side -arrow-.



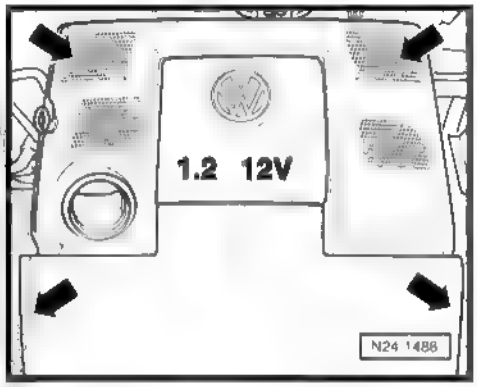
WARNING

The brake pipes in the hydraulic unit area must not be bent.

- Observe coding on vehicles equipped with code radio. Request coding if necessary.
- Disconnect the battery ⇒ Electrical system; Rep. Gr. 27 ; Starter, alternator, battery .

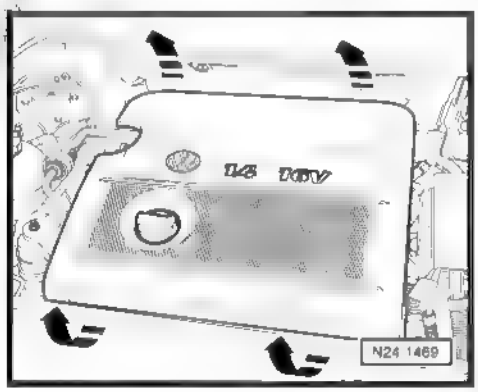
3 cylinders, injection engine:

- Disconnect the vacuum hoses from the upper air filter case section.
- Remove the cover by the points marked with -arrows-.



4 cylinders, injection engine:

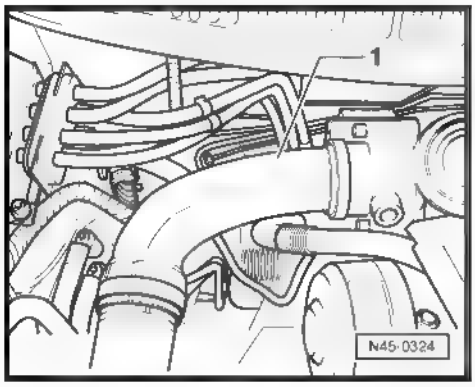
- Pull the hose from the oil separator and the check valve on the upper air filter case section.
- Remove the cover by the points marked with -arrows-.



3-cylinder diesel engine:

- Pull the engine cover up and away from the fittings.

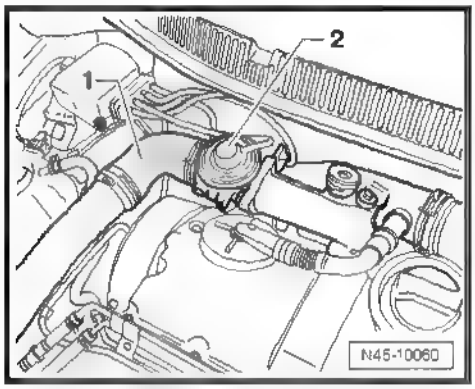
– Remove the intake hose -1-



4-cylinder diesel engine with injector pump unit:

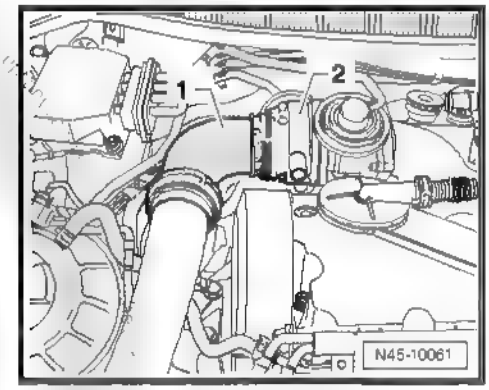
– Pull the engine cover up and away from the fittings

– Remove hose -1- and intake tube -2- ⇒ Engine; Rep. Gr. 23 ; Supply system - fuel injection (diesel) .



or:

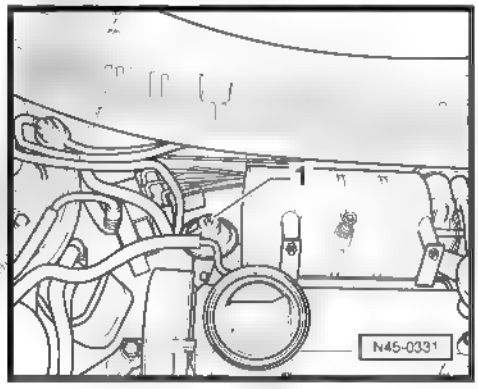
– Remove flexible suction tube-1- and Motor for intake manifold valve -V157- -2- ⇒ Engine; Rep. Gr. 23 ; Supply system - fuel injection (diesel) .



4 cylinder, diesel engine with distribution injector pump:

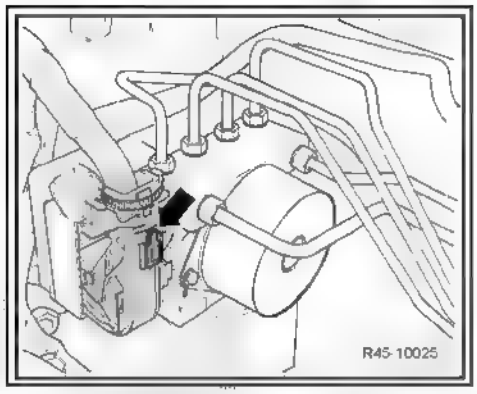
– Pull the engine cover up and away from the fittings.

– Remove the escape gas return valve -1-.

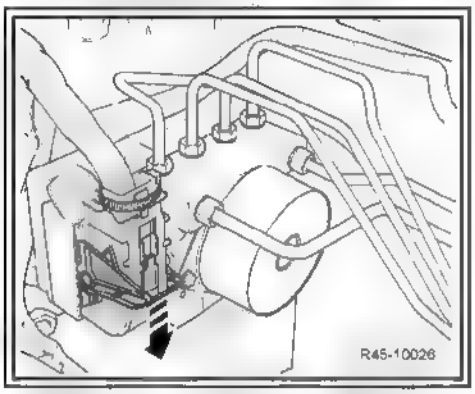


Continuation for all vehicles:

- Push down the connector safety lock -arrow- down.



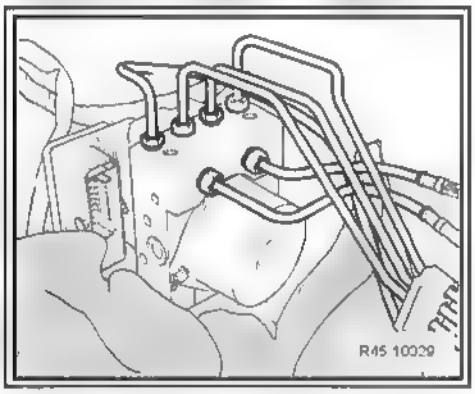
- Release the connector for ABS control unit -J104- -arrow- and remove it by pulling it forward
- Place the Brake pedal compression device -VAG 1869/2- .
- Press the brake pedal with the Brake pedal compression device -VAG 1869/2- should already be positioned.
- Close the left front venting plug.
- Place the hose from the bleeding reservoir over the left front brake caliper plug and open the plug.



- Place a sufficient amount of non-fraying cloths under ABS control unit -J104- and the ABS hydraulic unit -N55- .

WARNING

Make sure no brake fluid get on the contacts for ABS control unit -J104- .

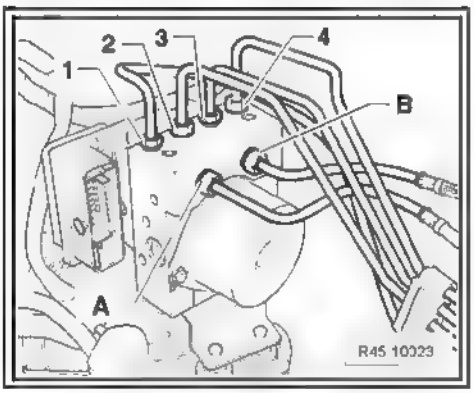


- Loosen and hang the-A-B-1-2-3-4- brake pipes from the break cylinder hydraulic unit.

Note

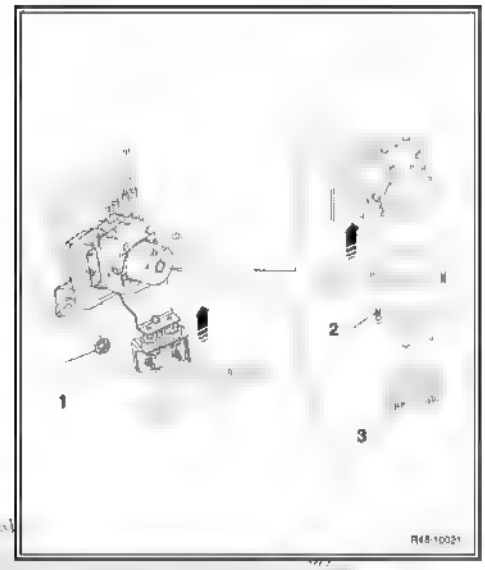
To avoid excessive leaking of brake fluid, use the exhaust valve protection cover to seal brake piping -A and B-.

- Close the brake pipes and threaded holes with plugs from the repair set number 1H0 698 311 A.



- Remove the hexagonal nut -1- of the ABS control unit -J104- / ABS hydraulic unit -N55- .
- Remove the ABS control unit -J104- / ABS hydraulic unit -N55- , pulling it up -arrow-.
- Remove the command device / hydraulic unit support by removing screws -2-.

There is no need to remove the lower ABS support by removing nuts -3-.



8.2.2 Install

Note

- *Only remove the plugs from the new hydraulic unit when the respective brake pipe is assembled.*
- *If the plugs were already removed from the hydraulic unit, the brake fluid may leak to the point that proper venting and filling can no longer be ensured.*

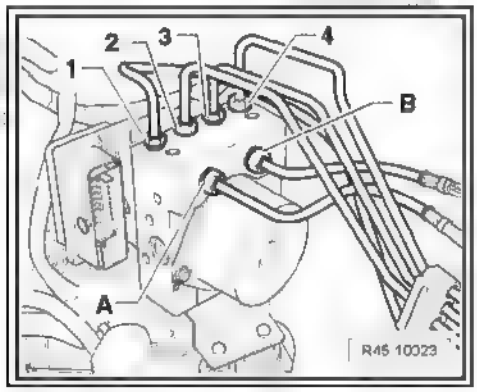
- Install the ABS unit on the support.
- Resume the installation in the removal reverse order.
- Remove the Brake pedal compression device -VAG 1869/2- .
- Bleeding brake system ⇒ page 85 .
- Code ABS control unit -J104- .

Connect the Diagnosis, Measurement and Information System - VAS 5051A/52- and select the function ⇒ page 4 .

- Code the radio.

Brake piping tightening torques:

ABS Bosch - (8.0 / 8.2)	
Brake pipes in the ABS set: -A-B-1-2-3-4-	
Threads M 10 x 1	14 Nm
Threads M 12 x 1	14 Nm



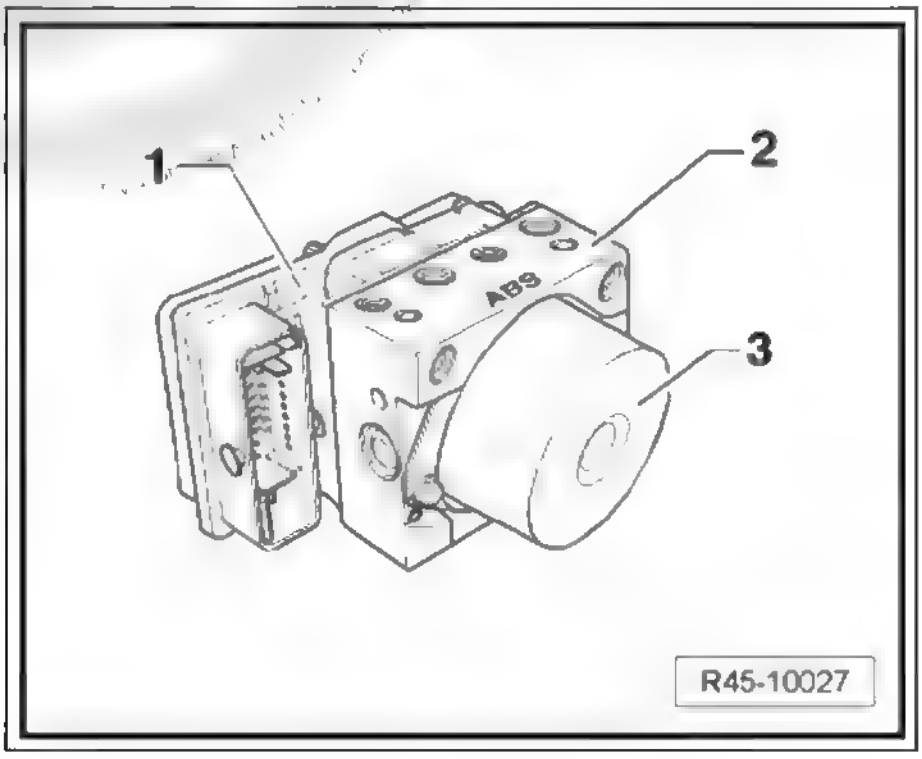
Tightening torques for fastening the ABS unit and supports:

ABS Bosch - (8 0 / 8 2)		
Positions	Nuts / Screws	Torque setting
-1-	Hexagon nut	20 Nm
-2-	Screw	8 Nm
-3-	Hexagon nut	20 Nm

8.2.3 Remove the ABS control unit -J104- from the ABS hydraulic unit -N55-

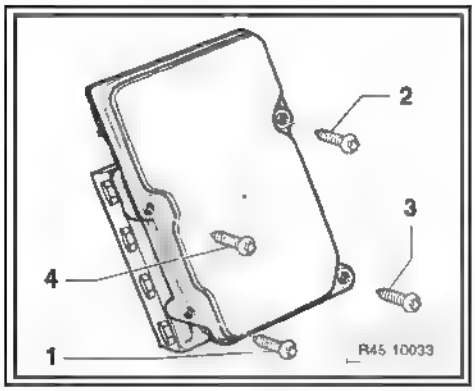
ABS Bosch 8.2 command unit:

1 - Command device
2 - Hydraulic unit
3 - Reflux pump



– Remove the ABS command unit.

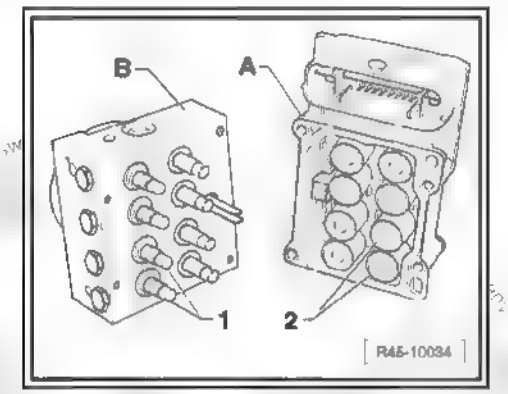
– Remove exterior E5 Torx screws -1 to 4- from the hydraulic unit



> **WARNING**
>
> *Torx screws should not be reused.*
>
> *It is forbidden to separate the reflux pump from the hydraulic unit*

– Carefully remove the command device from the hydraulic unit, pulling it up.

When removing the command equipment, be sure that the valve tubes -1- from the hydraulic unit -B- are not folded together with electromagnetic coils -2- from command equipment -A-.



– Cover the command equipment electromagnetic coils -A- with a non-fraying cloth.

– Check the sealing surfaces of the hydraulic unit for cleanliness; if necessary, clean with ethyl alcohol using a lint-free cloth.

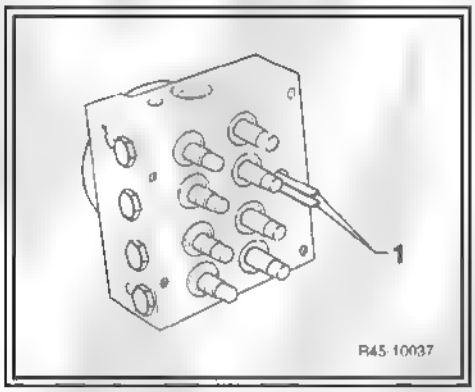
While working on the hydraulic system unit sealing surfaces, do not use files, metal scrapers, sandpapers or similar tools.

If the sealing surface of the hydraulic unit is damaged (scratches or signs of wear), replace the hydraulic unit for the brake system.

– Check contacts -1- on the hydraulic unit (reflux pump) for possible burn and rust spots.

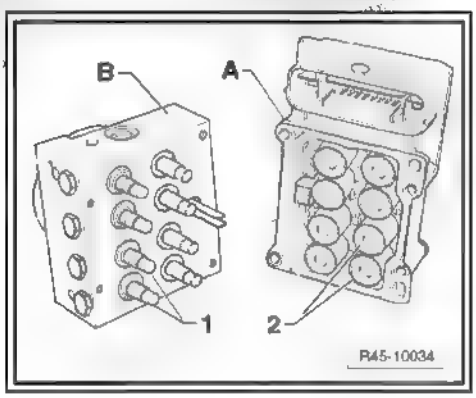
No work for grinding or cleaning the contacts is allowed due to the hydraulic unit being replaced along with the command device.

– When open , protect the hydraulic unit against damage to the valve tubes, covering it with a non-fraying cloth.



8.2.4 Install ABS control unit -J104- on the ABS hydraulic unit -N55-

Upon installing command device -A- from hydraulic unit -B-, ensure that the valve tubes -1- are not folded together with electromagnetic coils -2-.

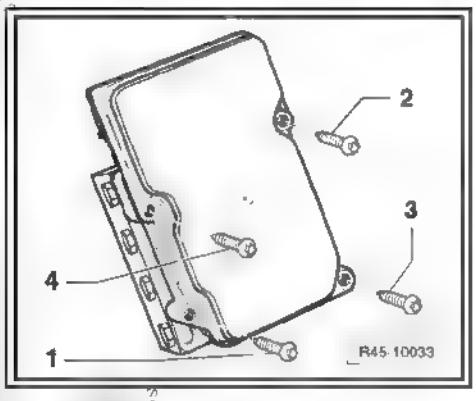


– Install the command device on the hydraulic unit.

– Press the command device onto the seating surface of the hydraulic unit until it is fully seated onto the rib of the hydraulic unit and maintain this position.

Use the screws "Torx" new supplied together

- Install the screws -1 and 2- and tighten until the command device is seated

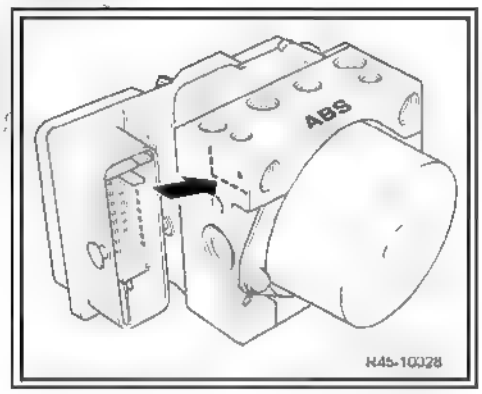


> **WARNING**
>
> *Torx screws should not be reused.*

- Then, tighten screws -3 and 4-.
- Tighten the screws in sequence from -1-2-3-4- to a torque of 16 Nm.

The hydraulic unit threads used to fasten the command device must not be damaged. If the thread is damaged (trouble in tightening the screws manually or screws not tightened to the specified torque), replace hydraulic system unit.

- Identify by the pulsing in the indicated area (hatched) -arrow-, each assembly of the hydraulic unit with the command device.



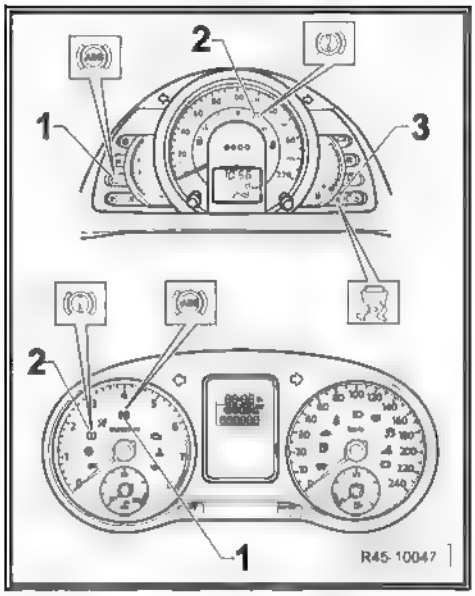
> **WARNING**
>
> *The hydraulic unit supports only 5 assemblies on the command unit. The command unit should be replaced after 5 assemblies.*

Install the ABS command unit.

9 Fault indication via control lamps

9.1 Control lamps

Item	Nomenclature
-1-	ABS control light -K47- .
-2-	Brake system control light -K118- .
-3-	ESP and ASR control light -K155- .



ABS control light -K47- :

- If the ABS control light -K47- for ABS -1- does not go off after the ignition is turned on and after the inspection is over, the fault may have the following causes:

-nd- the voltage supply is below 10 Volt.

-b- there is a fault in the ABS.

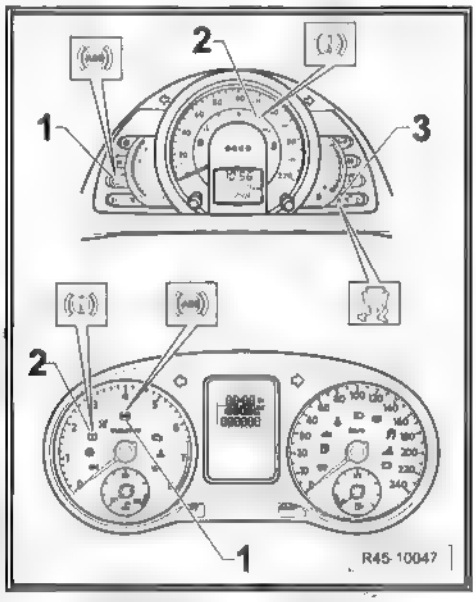
In the case of a fault in the ABS -b-, the antilock braking system is turned off, while the conventional brake system remains fully operational.

-c- there was a temporary fault in the speed sensor from the the last time the vehicle was started.

In the case of speed sensor -c- nd ABS control light -K47- automatically goes off after the vehicle is started and at a speed higher than 20 km/h.

-d- there is an interruption in the connection between the instrument panel and ABS control unit -J104- . ⇒ Electrical diagrams, diagnosis of electrical faults and installation locations .

ABS control light -K47- and Brake system control light -K118- .



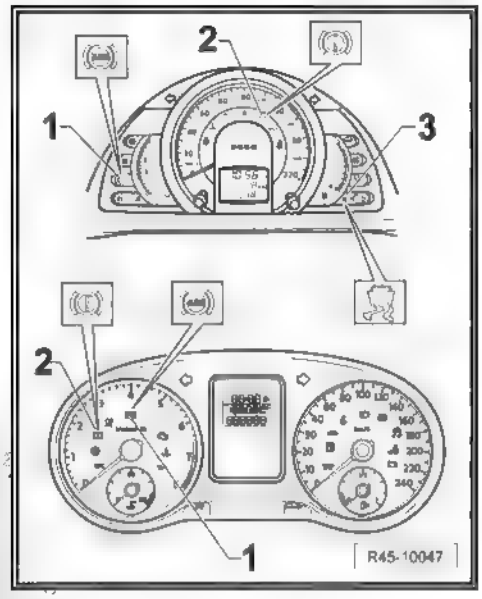
- If the ABS control light -K47- for ABS -1- turns off, while Brake system control light -K118- for brake system -2- remains on, the error may have the following causes

-A-: the parking brake is actuated.

-B-: the brake fluid level is too low

-C-: failure in the activation of Brake system control light -K118- for the brake system. ⇒ Electrical diagrams, diagnosis of electrical faults and installation locations

- In case the ABS control light -K47- of ABS -1- and Brake system control light -K118- for brake system -2- are switched on, this means that ABS system and EBV (electronic brake force distribution) system failed.



WARNING

After ABS control light -K47- from the ABS and Brake system control light -K118- from the brake system turn on, the rear wheels may lock early during braking.

ESP and ASR control light -K155- :

- If the ESP and ASR control light -K155- for the stabilization program, ASR/ESP -3- does not go off after the ignition is turned on and after the inspection is over, the fault may have the following causes:

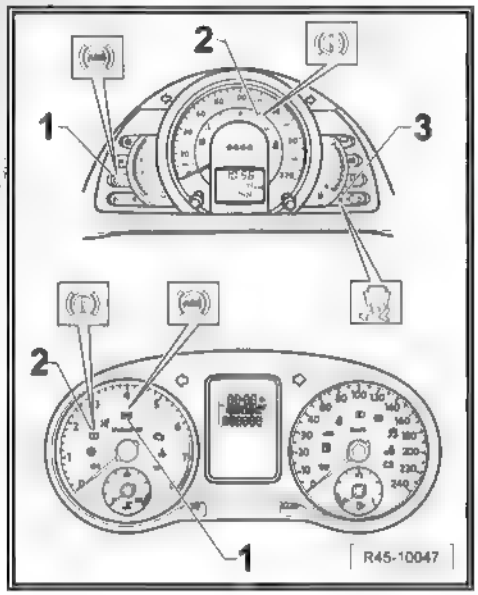
-nd- Short-circuit to positive in Switch for the ASR / ESP electronic stability program -E256- .

-b- A fault in switching the ESP and ASR control light -K155- for the stabilization program, ASR/ESP ⇒ Electrical diagrams, diagnosis of electrical faults and installation locations

-c- The Switch for the ASR / ESP electronic stability program -E256- .

There is a fault exclusively related to the ASR/ESP. The vehicle's ABS/EDS and EBV safety systems remain fully operational ⇒ Refer to the fault memory.

If the ESP and ASR control light -K155- for the ASR/ESP stabilization program blinks during the drive, then the ASR or ESP system is in adjustment mode.



10 ABS system components on the front and rear axles - remove and install

10.1 ABS system components on the front axle - remove and install

1 - Wheel roller bearing case

2 - Hexagon socket head screw
- ❑ 8 Nm

3 - ABS speed sensor
- ❑ It is checked by means of self-diagnosis.
- ❑ Before installing the sensor, clean the internal hole surface and coat it with Lubricating putty -G 000 650- around the sensor. Refer to the ⇒ Chemical Materials Manual .
- ❑ remove and install ⇒ page 36 .

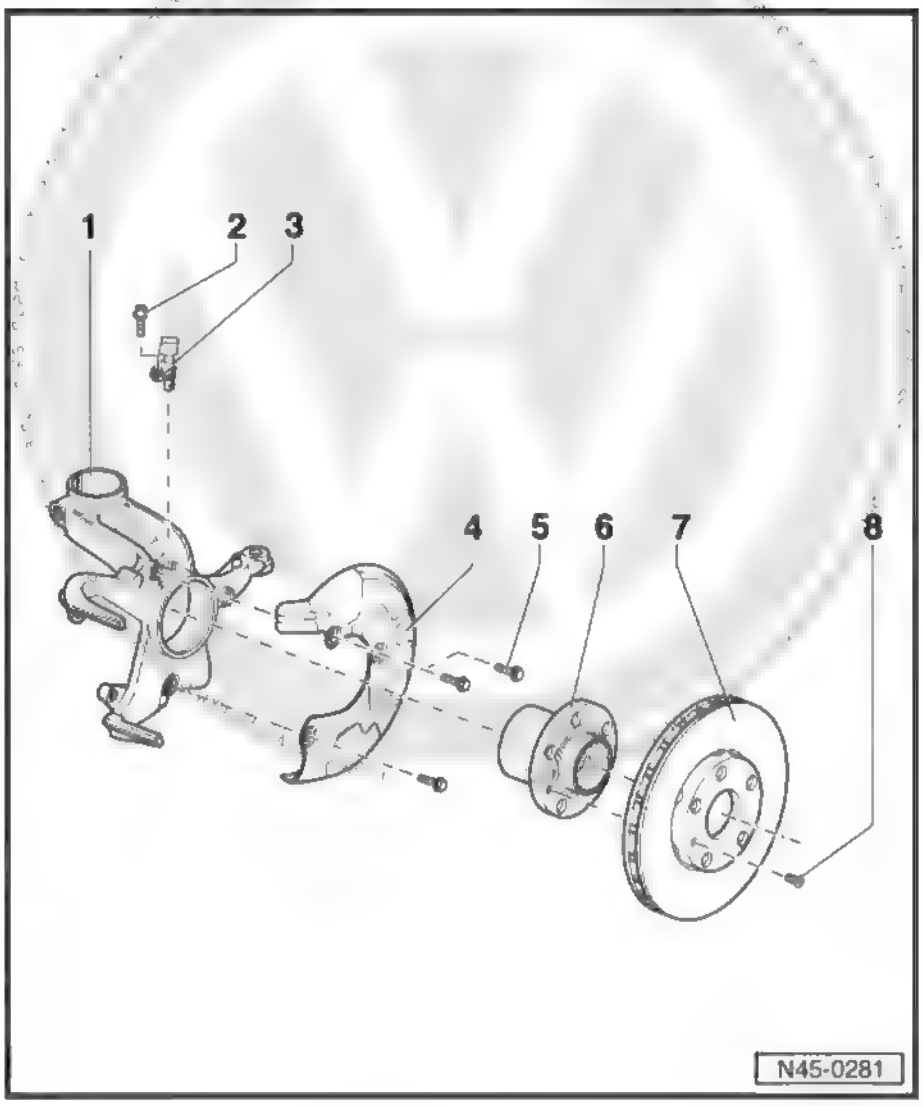
4 - Cover plate

5 - Hexagonal head screw
- ❑ 10 Nm

6 - Wheel hub with wheel bearings
- ❑ ABS sensor ring is assembled in the wheel hub.
- ❑ Remove and install ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .

7 - Brake disc

8 - Screw
- ❑ 8 Nm



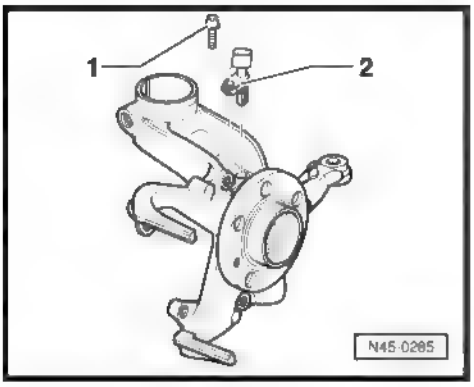
10.1.1 Front axle speed sensor - remove and install

10.1.2 Removal

– Lift the vehicle.

- Pull off connector -2- from the speed sensor cable and from the speed sensor
- Loosen the screw -1- from the wheel roller bearing case.
- Remove the ABS speed sensor from the wheel roller bearing case.

For easier viewing, the brake disc is represented as removed.



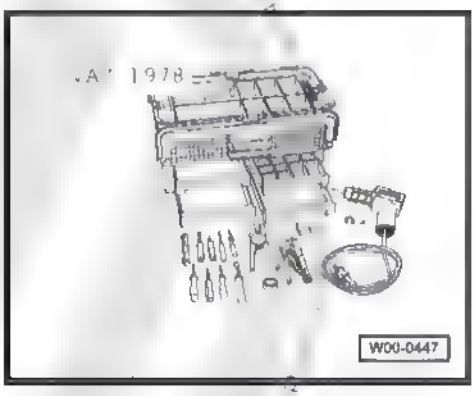
10.1.3 Installation

- Before installing the speed sensor, clean the internal hole surface and coat with Lubricating putty -G 000 650- around the sensor. Refer to the ⇒ Chemical Materials Manual .
- Place the speed sensor in the wheel roller bearing case and tighten the screw to 8 Nm.
- Connect the speed sensor to the speed sensor cable.
- Turn the steering wheel completely to the left and to the right and control the space available for the speed sensor cable.

10.2 Bosch 5.7 front speed sensor cables - remove and install

Special tools and workshop equipment required

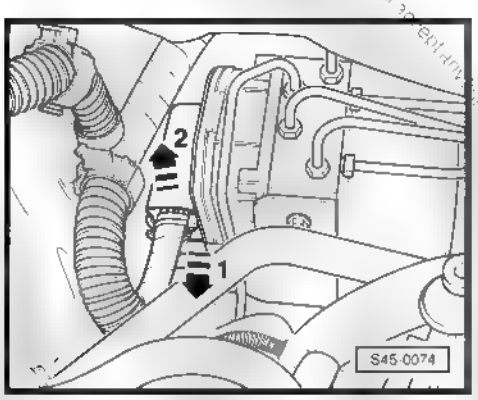
- Harness repair set -VAS 1978-



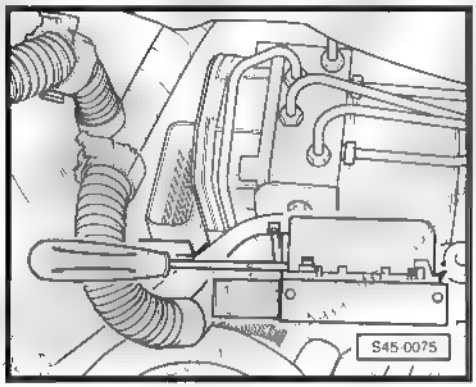
10.2.1 Removal

- Note the coding in vehicles with code radio equipment, request such coding if necessary.
- Disconnect the battery ⇒ Electrical system; Rep. Gr. 27 ; Starter, alternator, battery .

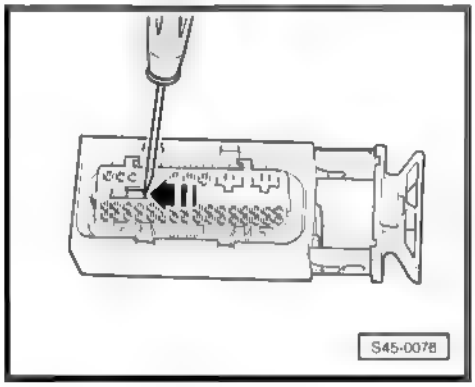
– Unlock and disconnect command unit -arrow 1- and pull it -arrow 2-.



– Release the multiple connector cover cap with a screwdriver and remove it.

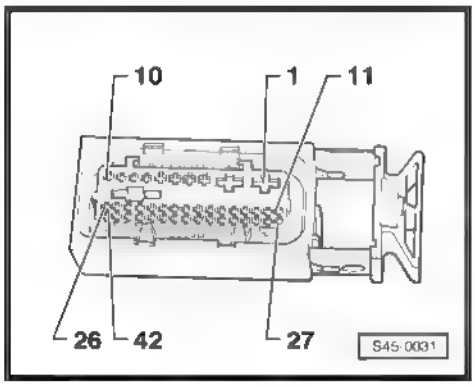


– Unlock the secondary lock (purple) with a small screwdriver in the arrow direction.

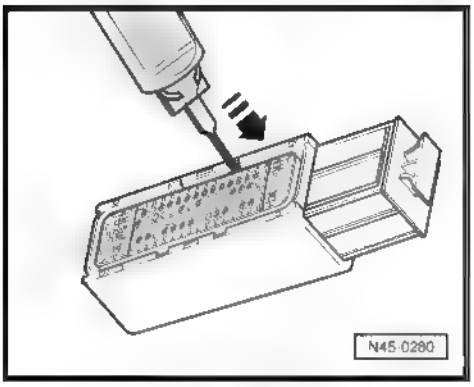


10.2.2 ABS Bosch 5.7, connector -T42-

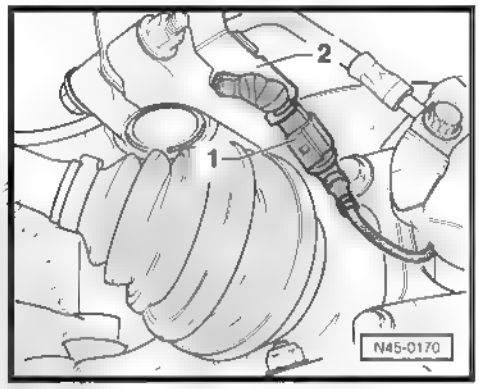
Contact assignment for connector -T42- ABS control unit -J104- ⇒ Electrical diagrams, diagnosis of electrical faults and installation locations .



- With an extractor from the Harness repair set -VAS 1978- pull out the respective contacts
- Disconnect the connector from the speed sensor cable as well as the speed sensor.



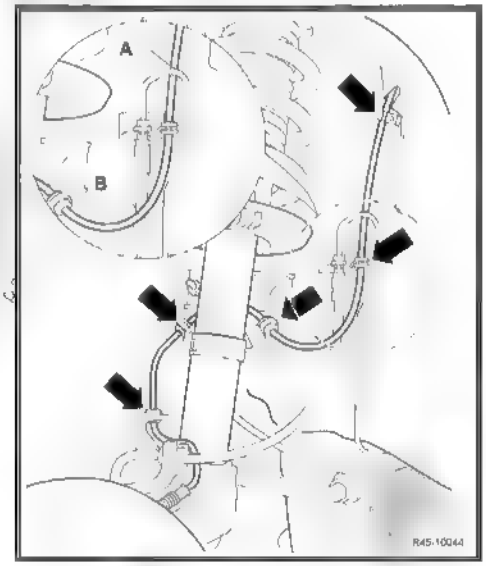
- Also disconnect the connector -1- in vehicles with the brake pad wear indicator.
- Disengage the support cable -2-.
- Remove the defective speed sensor cable and replace with a new cable.
- Connect the speed sensor to the speed sensor cable.



- Fasten the speed sensor cable in the locations indicated by the -arrows-.

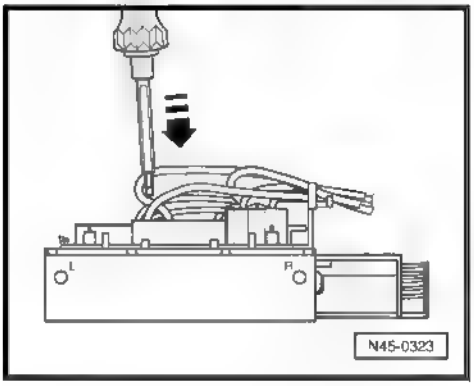
WARNING

Ensure that the speed sensor cable at point -A- passes behind the hydraulic brake lines and that the same at point -B- passes in front of the hydraulic brake pipe.



- Place the brake pad wear indicator connector on the suspension support.
- Insert the contact in the plug.

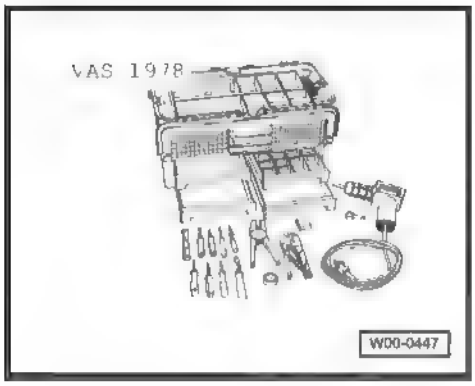
- Push to the stop the individual cable insulation with the assembly tool from the Harness repair set -VAS 1978- .
- Lock the contacts with the secondary lock and place the multiple connector cover cap



10.3 Bosch 8.0 / 8.2 front speed sensor cables - remove and install

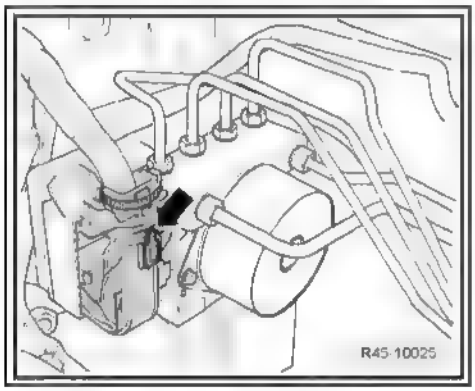
Special tools and workshop equipment required

- Harness repair set -VAS 1978-

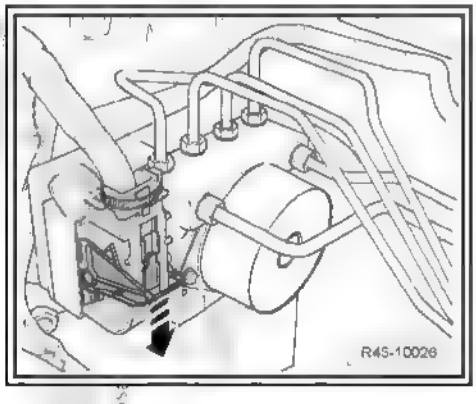


10.3.1 Removal

- Observe coding on vehicles equipped with code radio. Request coding if necessary.
- Disconnect the battery ⇒ Electrical system; Rep. Gr. 27 ; Starter, alternator, battery .
- Unlock the connector for ABS control unit -J104- pushing the -arrow-.



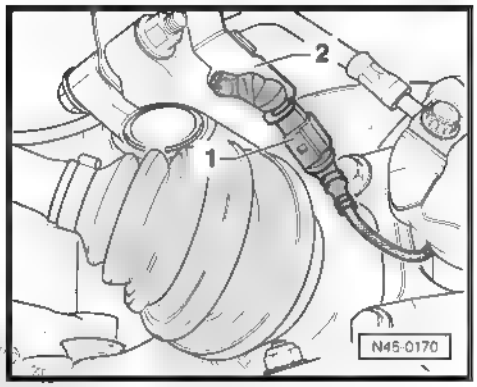
- Release the connector for ABS control unit -J104- -arrow- and remove it by pulling it forward.
- Release the multiple connector cover cap with a screwdriver and remove it.



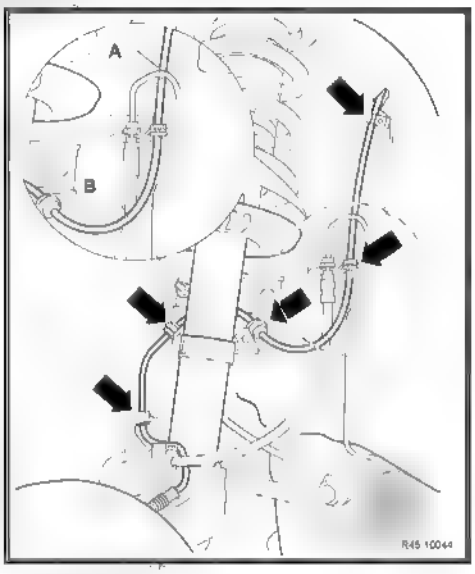
Contact assignment for the 38-pin connector -T38- / ABS control unit -J104- ⇒ Electrical diagrams, diagnosis of electrical faults and installation locations

- With an extractor from the Harness repair set -VAS 1978- pull out the respective contacts.
- Disconnect the connector from the speed sensor cable as well as the speed sensor.

- Also disconnect the connector -1- in vehicles with the brake pad wear indicator
- Disengage the support cable -2-.
- Remove the defective speed sensor cable and replace with a new cable
- Connect the speed sensor to the speed sensor cable



- Fasten the speed sensor cable in the locations indicated by the -arrows-.



WARNING

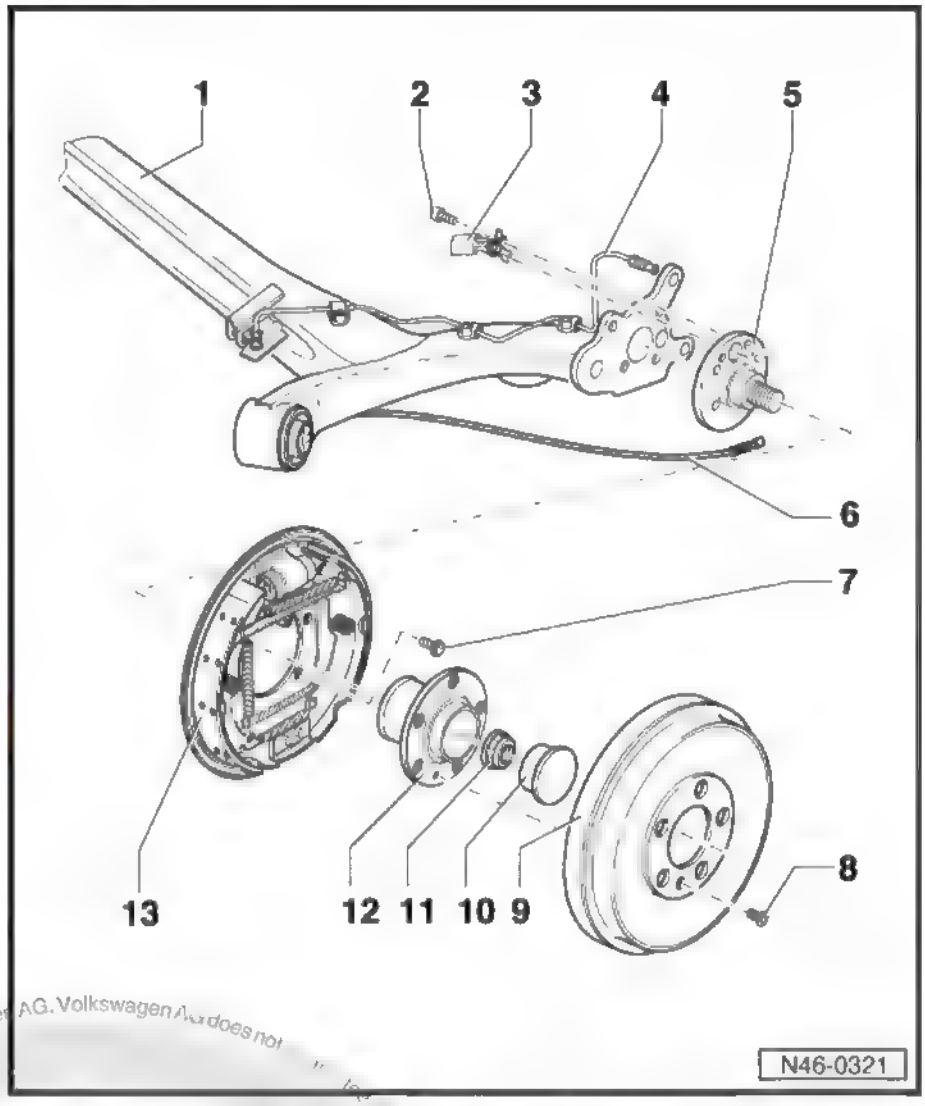
- *Ensure that the speed sensor cable at point -A- passes behind the hydraulic brake lines and that the same at point -B- passes in front of the hydraulic brake pipe.*

- Place the brake pad wear indicator connector on the suspension support.
- Insert the contact in the plug.
- Lock the contacts with the secondary lock and place the multiple connector cover cap.

10.4 ABS system components on rear axle (vehicles with drum brakes) - remove and install

WARNING

Always replace self-locking nuts and screws which were subjected to angular torque.



1 - Axle beam

2 - Hexagon socket head screw
- ❑ 8 Nm

3 - ABS speed sensor
- ❑ Shall be checked by means of self-diagnosis
- ❑ Before installing the sensor, clean the internal hole surface and coat it with Lubricating putty -G 000 650- around the sensor. Refer to the ⇒ Chemical Materials Manual .
- ❑ Drum brake ⇒ page 42 .

4 - Brake tube

5 - Axle end

6 - Parking brake cable

7 - Hexagonal head screw
- ❑ With spring-washer

8 - Screw

9 - Brake drum
- ❑ Brake drum diameter, 200 mm.
- ❑ Wear limit 201.5 mm.
- ❑ Before removing the brake drum, you must pull the brake back ⇒ page 62 .
- ❑ Clean carefully and check for wear, damages, dimensional precision and braking surface with no apparent damages.

10 - Cover
- ❑ Pull out and fit ⇒ Running gear, ??axles, ??steering; Rep. Gr. 42 ; Rear suspension .

11 - ?Rifled nut
- ❑ self-locking
- ❑ Replace

12 - Wheel hub with wheel roller bearing and rotor
- ❑ Always replace completely.
- ❑ Remove and install ⇒ Running gear, ??axles, ??steering; Rep Gr. 42 , Rear suspension .

13 - Caliper body with brake shoes
- ❑ Before removing the brake drum, stand back the brake ⇒ page 62 .

10.4.1 Speed sensor on rear axle (drum brake) - remove and install

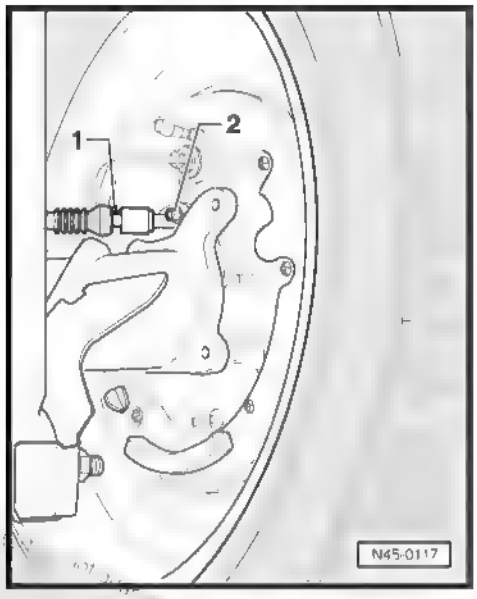
Removal:

– Lift the vehicle.

- Pull off connector -1- from the speed sensor cable, as well as the speed sensor
- Loosen the screw -2- from the axle end.
- Disconnect the speed sensor from the axle end.

Installation:

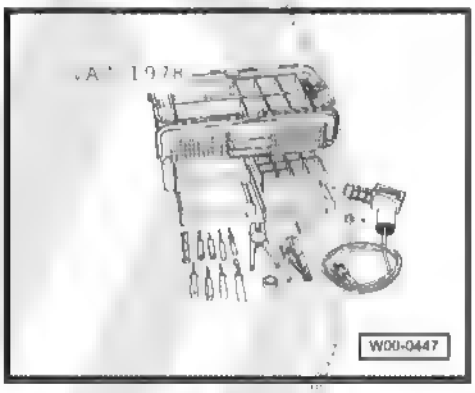
- Before installing the speed sensor, clean the internal hole surface and coat with Lubricating putty -G 000 650- around the sensor. Refer to the ⇒ Chemical Materials Manual .
- Place the speed sensor in the axle tip hole and tighten the screw to 8 Nm.
- Connect the speed sensor to the speed sensor cable.



10.4.2 Rear speed sensor cables - remove and install

Special tools and workshop equipment required

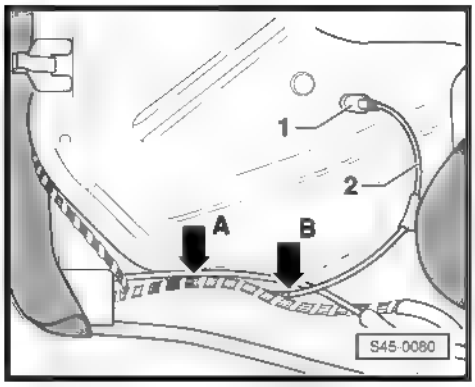
- Harness repair set -VAS 1978-



Removal:

- Observe coding on vehicles equipped with code radio. Request coding if necessary.
- Disconnect the battery ⇒ Electrical system; Rep. Gr. 27 ; Starter, alternator, battery .
- Disconnect the connector from the speed sensor cable as well as the speed sensor.
- Remove the back door sill lining.
- Pull back the carpeting around the seat area ⇒ Body - internal mountings; Rep. Gr. 70 ; Lining / Insulation .

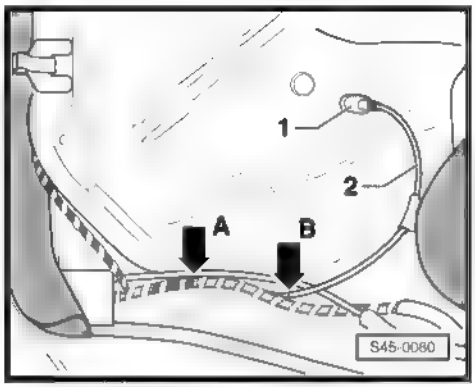
– Remove the rubber caul -1- and pull the revolution sensor cable -2- inward of inner compartment



– Cut the speed sensor cable between -arrows- -A- and -B- using the insulating pliers from the Harness repair set -VAS 1978- and remove the defective section -2- of cable

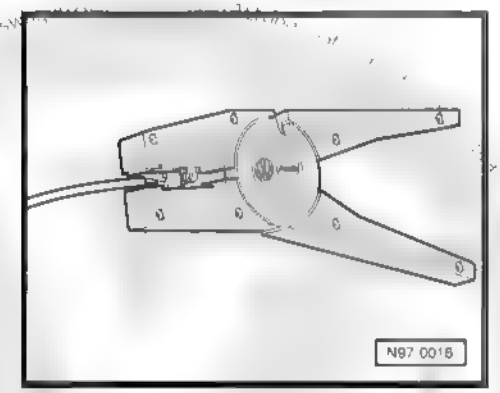
Installation:

– Insert the new speed sensor cable.

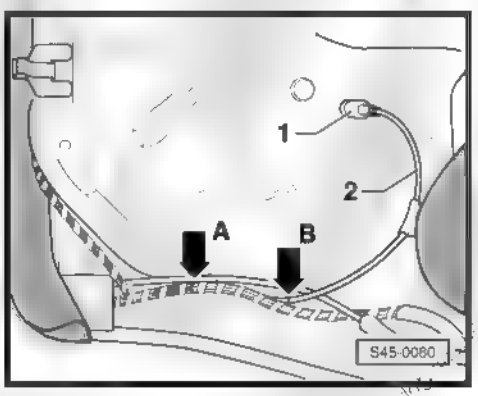


– Strip 15 mm of the cable stub with the insulating pliers and turn the stripped cable halfway.
– Connect the speed sensor cable using a cable fastener from the Harness repair set -VAS 1978- .
– Connect the speed sensor to its corresponding cable connector.

When installing the speed sensor cable, make sure it is not twisted in the wheel housing.



– Fasten the rubber caul -1-.
– Fold down floor covering in area of bench seat.
– Install the rear door sill lining ⇒ Body - Internal mountings; Rep. Gr. 70 ; Lining / Insulation .



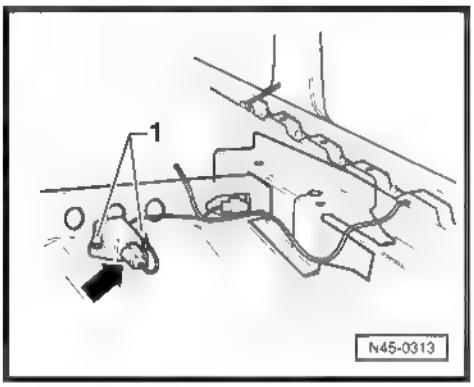
11 ESP system components - remove and install

11.1 Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- - remove and install

The Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- are packed in a case and are located on the seat cross member under the carpet.

11.1.1 Removal

- Remove the left seat ⇒ Body - internal mountings; Rep. Gr. 72 ; Seat framework .
- Remove the left door sill lining ⇒ Body - internal mountings; Rep. Gr. 70 ; Lining / Insulation .
- Pull away the floor carpet until Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- become free.
- Disconnect the connector of the Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- .
- Loosen the two fastening nuts -1-.
- Remove the Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- .



11.1.2 Installation

> **WARNING**
>
> *Very strong vibrations may damage the Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- .*

- Installation is performed in the reverse sequence of the removal

When installing the Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- , correct, effortless seating on the fittings must be guaranteed

Under no circumstances, Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200- should be positioned forcefully through attaching nuts.

Tightening torque	
Fastening nuts for the Lateral tilting intensity sensor -G202- and Lateral acceleration sensor -G200-	6 Nm

11.2 Steering angle sensor -G85- - remove and install

The steering angle sensor is installed between the steering wheel and the steering column switch.

11.2.1 Removal

- Position the wheels in a straight angle
- Remove the Airbag unit, if there is anyone, and the steering wheel. ⇒ Running gear, ??axles, ??steering, Rep. Gr. 48 , Steering .
- Remove the Steering angle sensor -G85- .

11.2.2 Installation

- Install the Steering angle sensor -G85- and carry out the basic adjustment.
- Carry out basic adjustment with the Diagnosis, Measurement and Information System -VAS 5051A/52- in the function "Assisted troubleshooting".
- Connect the Diagnosis, Measurement and Information System -VAS 5051A/52- and advance until the is displayed "Function/component selection".

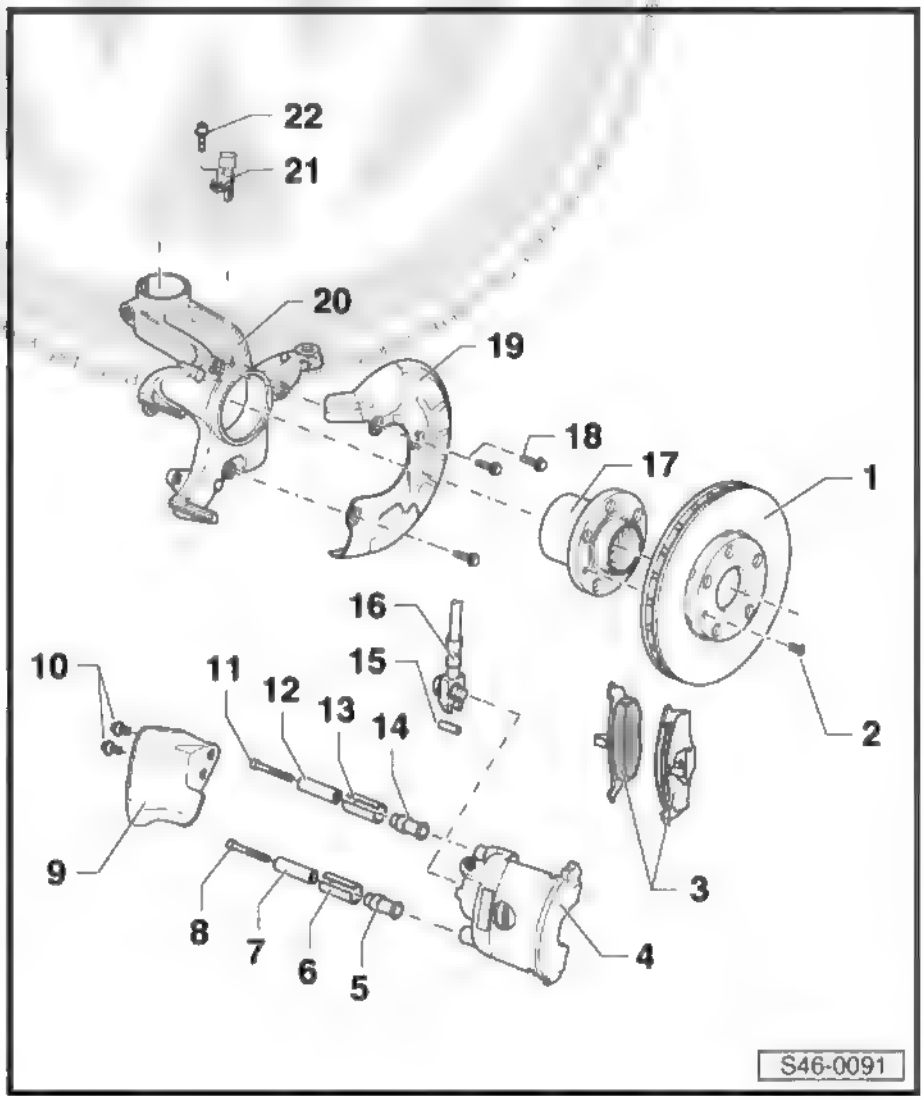
46 – Brakes - Mechanical system

1 Front wheel brake - repair

1.1 Front wheel brake (FS II) - assembly overview

Note

- *To draw the braking fluid from its reservoir, always use the Brake filling and bleeding equipment -VAS 5234- or the -V.A.G 1869/4-.*
- *Before removing the brake caliper or removing a hose, install the Brake pedal compression device -VAG 1869/2-.*



1 - Brake disc
- ❑ Thickness: 18 mm
- ❑ Wear limit: 16 mm
- ❑ Always replace both discs on the same axle
- ❑ In order to remove, first loosen the brake caliper
- ❑ Maximum disk bumping 0.03 mm
- ❑ Maximum disk bumping + bearing 0.11 mm

2 - Screw
- ❑ 8 Nm

3 - Brake pads
- ❑ Thickness: 12 mm, brake pad with larger surface is installed on the outer side
- ❑ With wear indicator (available according to the vehicle version, limit 2 to 3 mm)
- ❑ Wear limit with rear plate: 7 mm
- ❑ Check the thickness ⇒ Maintenance ; Booklet ;
- ❑ Always replace both pads on the same axle
- ❑ Remove and install ➢ page 48
- ❑ When replacing the brake pad, do not remove the brake hose

4 - Brake caliper
- ❑ Repair ➢ page 76
- ❑ Remove and install ➢ page 50

5 - Lower sleeve

6 - Lower bushing

7 - Lower spacer sleeve

8 - Lower internal hex head screw
- ❑ 25 Nm

9 - Air duct

10 - Hexagon screw
- ❑ 10 Nm

11 - Upper hexagon hex head screw
- ❑ 25 Nm

12 - Upper spacer sleeve

13 - Upper bushing

14 - Upper sleeve

15 - Fastening sleeve

16 - Brake hose with annular nozzle and hollow screw
- ❑ 35 Nm

17 - Wheel hub
- ❑ Remove and install ⇨ Frame; Rep. Gr. 40 ; Wheel roller bearings - replace

18 - Hexagon screw
- ❑ 10 Nm

19 - Cover plate

20 - Wheel roller bearing case

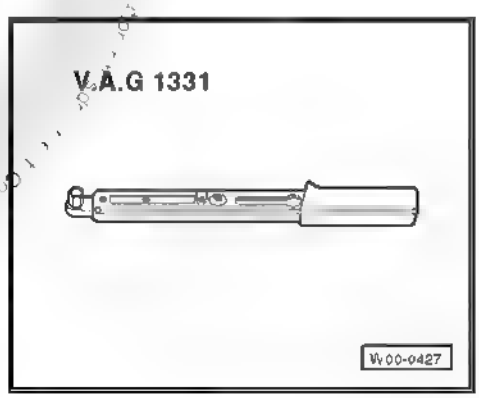
21 - ABS speed sensor
- ❑ Before installing the sensor, clean the hole inner surface and apply Lubricating putty -G 000 650- around the sensor

22 - Hexagon socket head screw
- ❑ 8 Nm

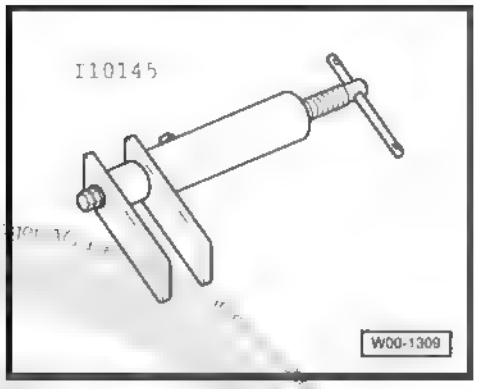
1.2 Brake pads (FS II) - remove and install

Special tools and workshop equipment required

- ♦ Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-



- Plunger resetting device -T10145-

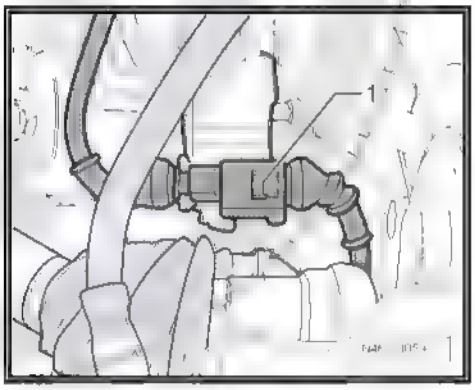


1.2.1 Removal

Note

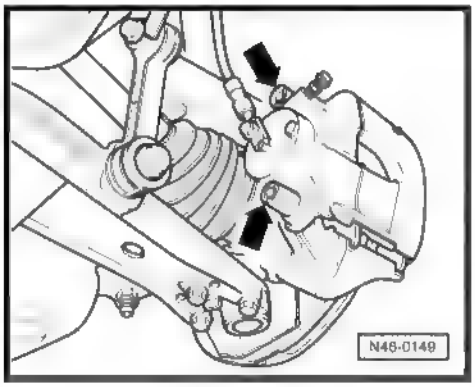
While removing, identify the brake pads that will be reused. Install them at the same place in order to avoid creating different braking action!

- Remove the wheels.
- For vehicles with brake pad wear indicator, disconnect the connector -1-.
- Remove the cover caps.



- Loosen the upper and lower screws -arrows- from the brake caliper and pull them out.
- Remove the brake caliper and wire it, so that the brake caliper weight does not tension nor damage the brake hose.
- Remove the brake pads.

Only use alcohol for cleaning the brake cylinder.

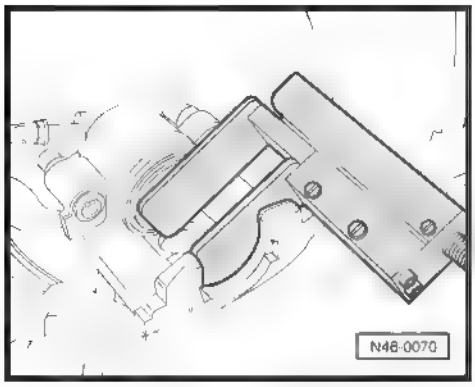


1.2.2 Installation

Prior to pressing the plungers, collect the brake fluid from the reservoir into a bottle, as it might leak and cause damages in case it circulates during this interval.

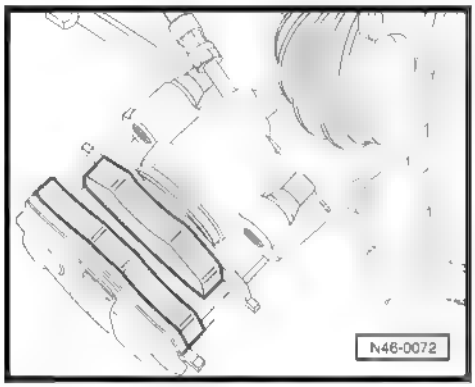
- Install the bleed hose of the bleed reservoir on the bleed valve of the brake caliper and open the valve.

– Press the plunger with the Plunger resetting device -T10145- .
– Close the valve and remove the bleed bottle.
– Install the brake pads

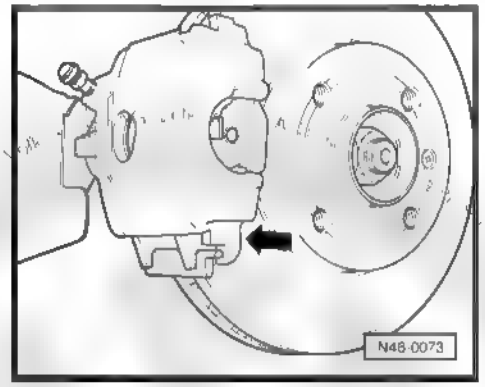


Note

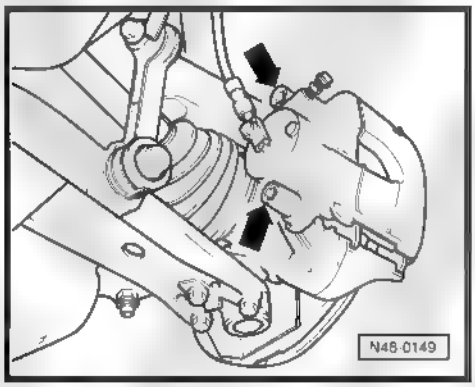
The brake pad with the larger surface is installed on the outer side!



– Install the brake caliper with the pads in the wheel bearing case by placing the lower portion at first -arrow-.
– The brake caliper pin shall be behind the wheel bearing case guide!



– Loosen the upper and lower screws -arrows- at the wheel bearing case with 25 Nm.
– On vehicles with brake wear indicator, connect the connector.
– Install the wheels.



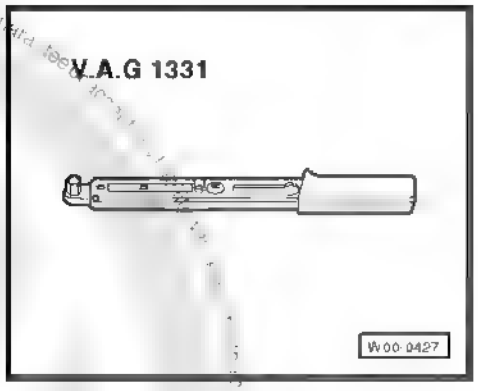
Note

- *After each brake pad replacement, repeatedly press the brake pedal with force while the vehicle is parked, so that the brake pads perfectly seat for operation.*
- *After replacing the brake pads, check the brake fluid level.*

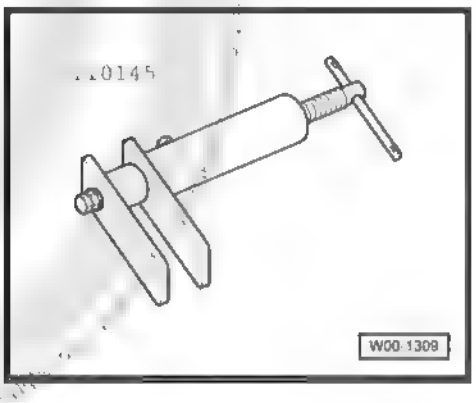
1.3 Brake caliper (FS II) - remove and install

Special tools and workshop equipment required

- Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-



- Plunger resetting device -T10145-

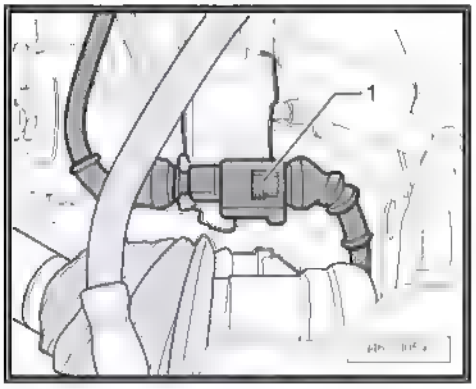


1.3.1 Removal

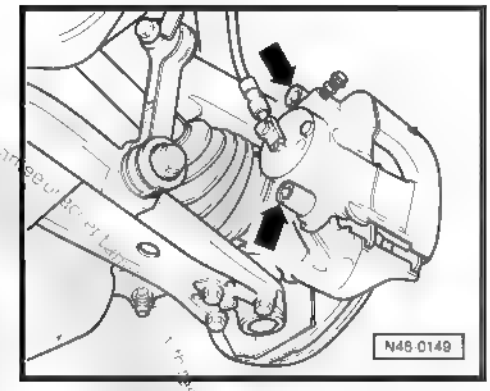
Note

While removing, identify the brake pads that will be reused. Install them at the same place in order to avoid creating different braking action!

- Remove the wheels.
- For vehicles with brake pad wear indicator, disconnect the connector -1-.
- Remove the cover caps.



- Loosen the upper and lower screws -arrows- from the brake caliper and pull them out
- Remove the brake pads
- Install the bleed hose of the bleed reservoir on the bleed valve of the brake caliper and open the valve
- Press the plunger with the Plunger resetting device -T10145- .
- Remove the brake hose
- Close the valve and remove the bleed bottle.

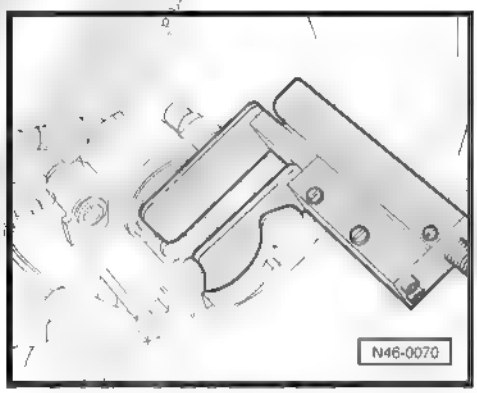


1.3.2 Installation

- Install the brake hose.

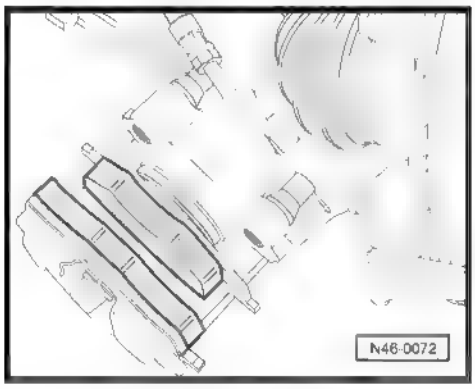
Prior to pressing the plungers, collect the brake fluid from the reservoir into a bottle, as it might leak and cause damages in case it circulates during this interval.

- Install the bleed hose of the bleed reservoir on the bleed valve of the brake caliper and open the valve.
- Press the plunger with the Plunger resetting device -T10145- .
- Close the valve and remove the bleed bottle.
- Install the brake pads.

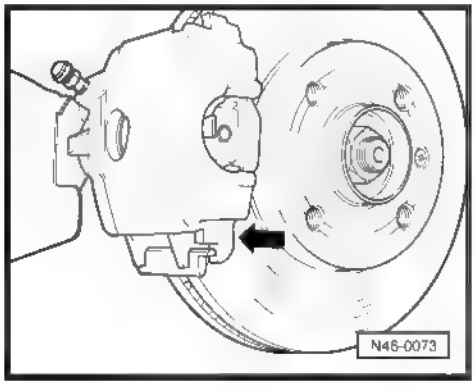


Note

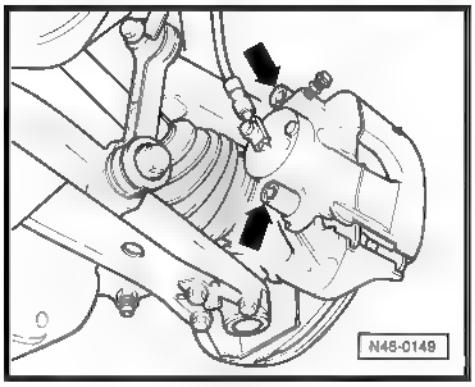
The brake pad with the larger surface is installed on the outer side!



- Install the brake caliper with the pads in the wheel bearing case by placing the lower portion at first -arrow-.
- The brake caliper pin shall be behind the wheel bearing case guide!



- Loosen the upper and lower screws -arrows- at the wheel bearing case with 25 Nm.
- On vehicles with brake wear indicator, connect the connector.
- Install the wheels



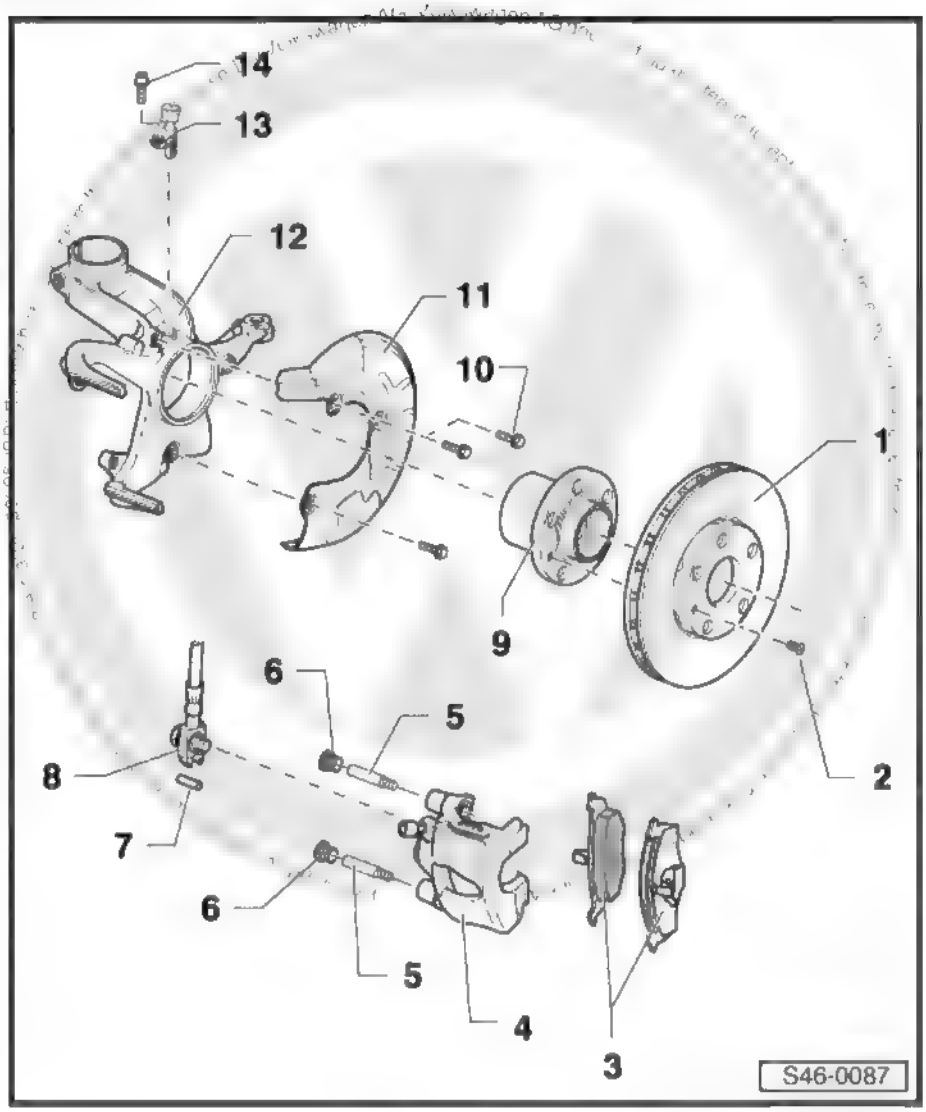
Note

- *After each brake pad replacement, repeatedly press the brake pedal with force while the vehicle is parked, so that the brake pads perfectly seat for operation.*
- *After replacing the brake pads, check the brake fluid level.*

1.4 Front wheel brake (FS II) - Assembly overview

Note

- *To draw the braking fluid from its reservoir, always use the Brake filling and bleeding equipment -VAS 5234- or the -V.A.G 1869/4- .*
- *Before removing the brake caliper or removing a hose, install the Brake pedal compression device -VAG 1869/2- .*



1 - Brake disc
- Thickness: 22 mm
- Wear limit: 19 mm
- Always replace both discs on the same axle
- In order to remove, first loosen the brake caliper
- Maximum disk bumping 0.03 mm
- Maximum disk bumping + bearing 0.115 mm

2 - Screw
- 8 Nm

3 - Brake pads
- Thickness: 14 mm, brake pad with larger surface is installed on the outer side
- With wear indicator (available according to the vehicle version, limit 4 mm)
- Wear limit with rear plate: 7 mm
- Check the thickness ⇒ Maintenance ; Booklet ;
- Always replace both pads on the same axle
- Remove and install ⇒ page 55
- When replacing the brake pad, do not remove the brake hose

4 - Brake caliper
- Repair ⇒ page 79
- Remove and install ⇒ page 57

5 - Guide pin
- 30 Nm

6 - Cover cap

7 - Fastening sleeve

8 - Brake hose with annular nozzle and hollow screw
- 35 Nm

9 - Wheel hub
- Remove and install ⇒ Frame; Rep. Gr. 40 , Wheel roller bearings - replace

10 - Hexagon screw
- 10 Nm

11 - Cover plate

12 - Wheel roller bearing case

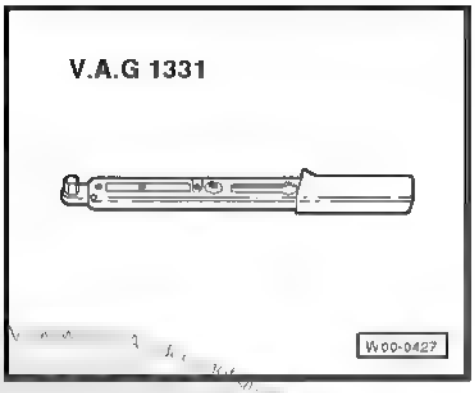
13 - ABS speed sensor
- Before installing the sensor, clean the hole inner surface and apply Lubricating putty -G 000 650- around sensor

14 - Hexagon socket head screw
- ❑ 8 Nm

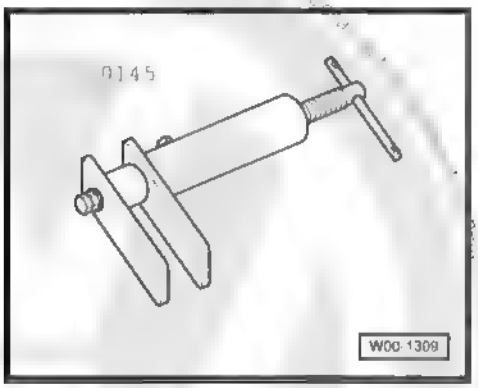
1.5 Brake pads (FS III) - remove and install

Special tools and workshop equipment required

- ♦ Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-



- ♦ Plunger resetting device -T10145-

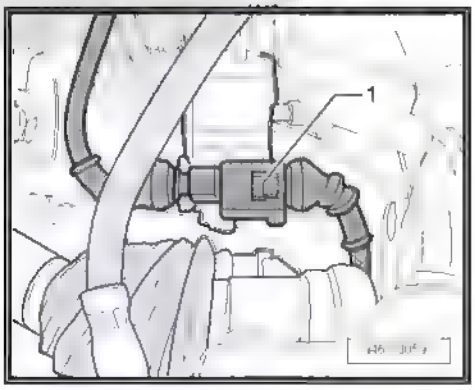


1.5.1 Removal

Note

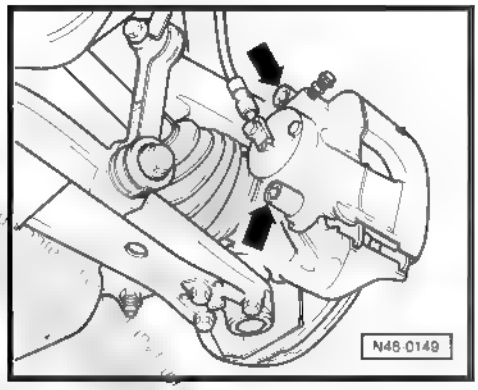
While removing, identify the brake pads that will be reused. Install them at the same place in order to avoid creating different braking action!

- Remove the wheels.
- For vehicles with brake pad wear indicator, disconnect the connector -1-.
- Remove the cover caps.



- Loosen the two guide pins -arrows- from the brake caliper and pull them out.
- Remove the brake caliper and wire it, so that the brake caliper weight does not tension nor damage the brake hose.
- Remove the brake pads

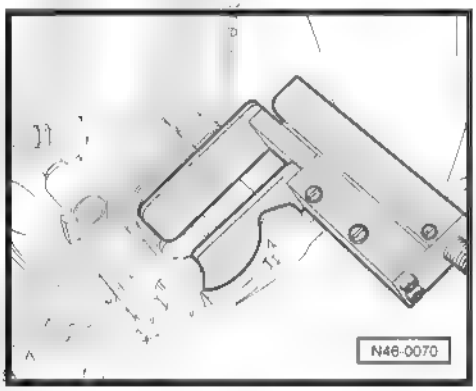
Only use alcohol for cleaning the brake cylinder.



1.5.2 Installation

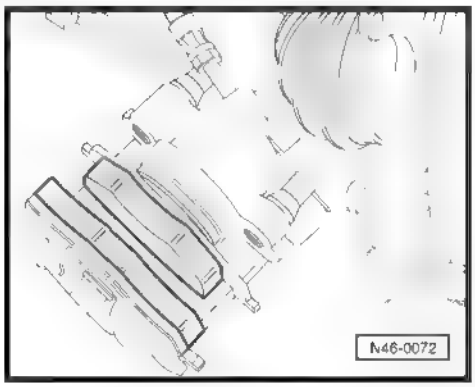
Prior to pressing the plungers, collect the brake fluid from the reservoir into a bottle, as it might leak and cause damages in case it circulates during this interval.

- Install the bleed hose of the bleed reservoir on the bleed valve of the brake caliper and open the valve.
- Press the plunger with the Plunger resetting device -T10145- .
- Close the valve and remove the bleed bottle.
- Install the brake pads.

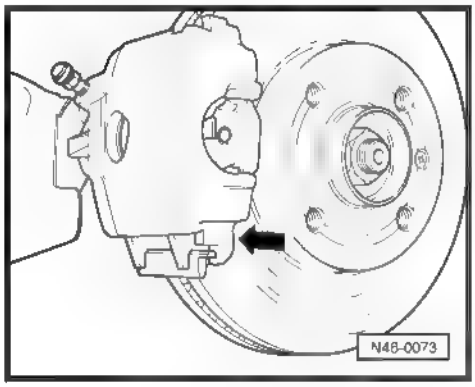


Note

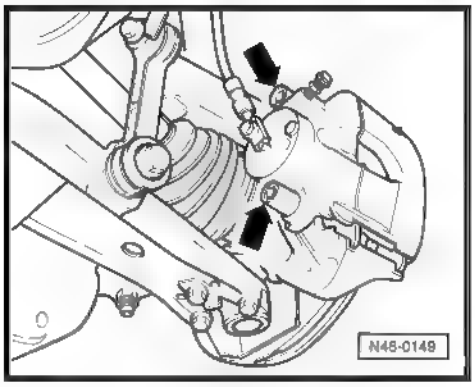
The brake pad with the larger surface is installed on the outer side!



- Install the brake caliper with the pads in the wheel bearing case by placing the lower portion at first -arrow-.
- The brake caliper pin shall be behind the wheel bearing case guide!



- Loosen the two guide pins -arrows- at the wheel bearing case with 30 Nm
- On vehicles with brake wear indicator, connect the connector.
- Install the wheels



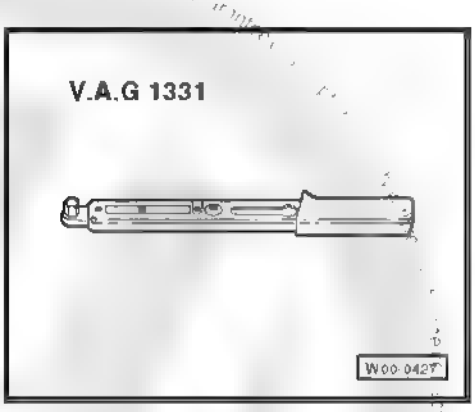
Note

- *After each brake pad replacement, repeatedly press the brake pedal with force while the vehicle is parked, so that the brake pads perfectly seat for operation.*
- *After replacing the brake pads, check the brake fluid level.*

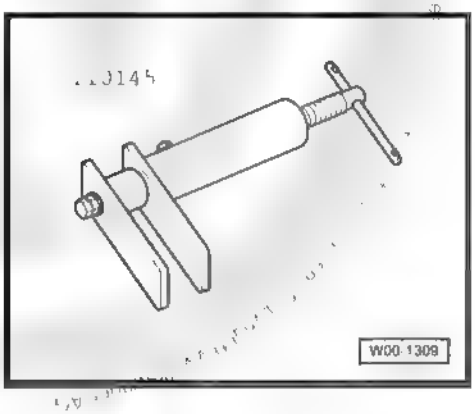
1.6 Brake caliper (FS III) - remove and install

Special tools and workshop equipment required

- Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-



- Plunger resetting device -T10145-



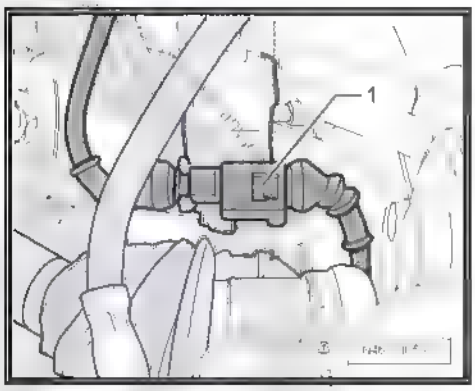
1.6.1 Removal

Note

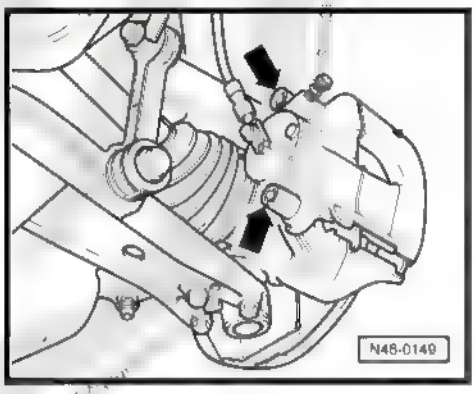
While removing, identify the brake pads that will be reused. Install them at the same place in order to avoid creating different braking action!

- Remove the wheels

– For vehicles with brake pad wear indicator, disconnect the connector -1-.
– Remove the cover caps



– Loosen the two guide pins -arrows- from the brake caliper and pull them out.
– Remove the brake pads.
– Install the bleed hose of the bleed reservoir on the bleed valve of the brake caliper and open the valve.
– Press the plunger with the Plunger resetting device -T10145- .
– Remove the brake hose.
– Close the valve and remove the bleed bottle.

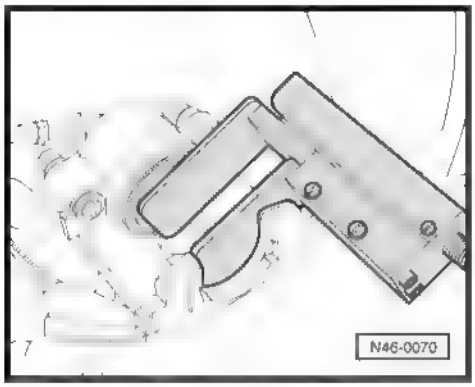


1.6.2 Installation

– Install the brake hose.

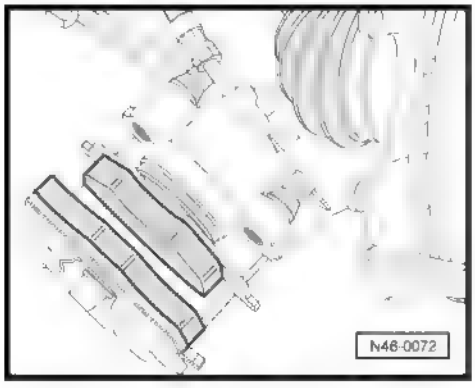
Prior to pressing the plungers, collect the brake fluid from the reservoir into a bottle, as it might leak and cause damages in case it circulates during this interval.

– Install the bleed hose of the bleed reservoir on the bleed valve of the brake caliper and open the valve.
– Press the plunger with the Plunger resetting device -T10145- .
– Close the valve and remove the bleed bottle.
– Install the brake pads.

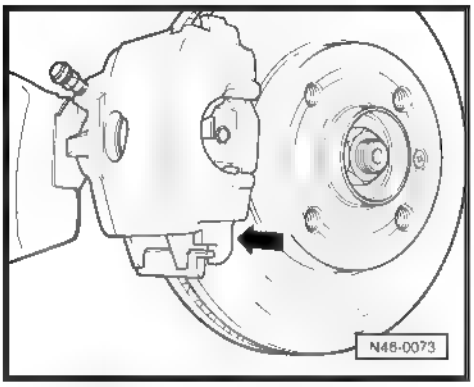


Note

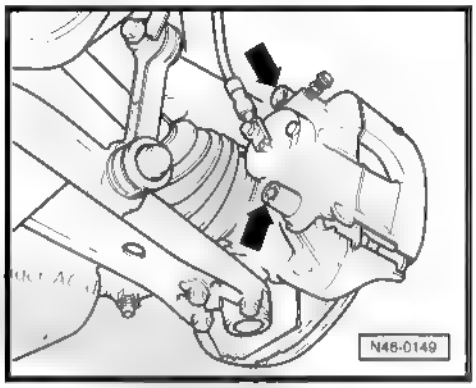
The brake pad with the larger surface is installed on the outer side!



- Install the brake caliper with the pads in the wheel bearing case by placing the lower portion at first -arrow-.
- The brake caliper pin shall be behind the wheel bearing case guide!



- Loosen the two guide pins -arrows- at the wheel bearing case with 30 Nm.
- On vehicles with brake wear indicator, connect the connector.
- Install the wheels.



Note

- *After each brake pad replacement, repeatedly press the brake pedal with force while the vehicle is parked, so that the brake pads perfectly seat for operation.*
- *After replacing the brake pads, check the brake fluid level.*

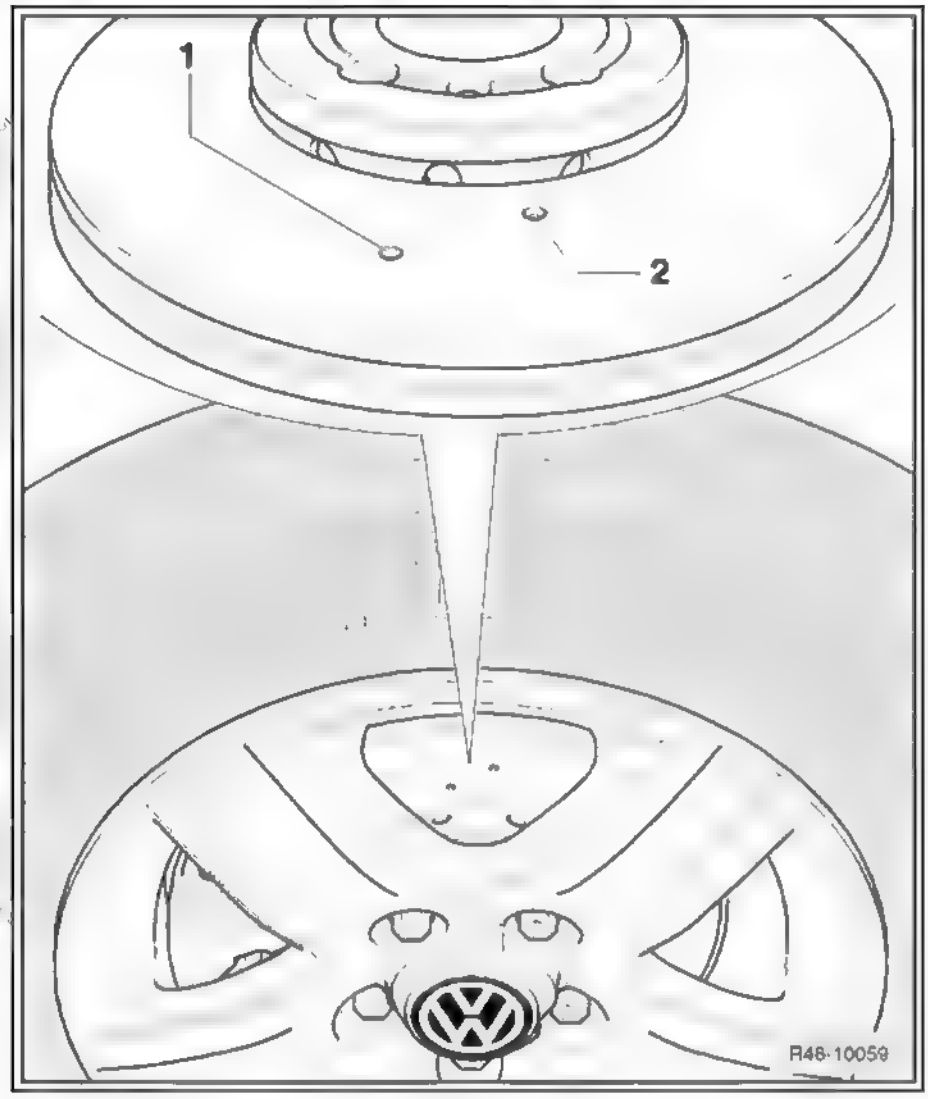
1.7 Brake disc with visual check - check

Note

- *The wear indicators on the front brake discs (visual check) indicate when the brake discs must be changed. This check is made by using the marks on the contact surface of the brake discs.*
- *Always check both discs on the same axle and, if necessary, replace them.*

1.7.1 Vehicles with light-alloy wheel

Position the vehicles so that the brake disc wear indicators (visual check) can be viewed.



Note

If the front brake disc wear indicator markings (visual check) cannot be viewed due to wheel design, the wheels must be removed.

Checking conditions of front brake disc wear:

1 - Wear indicators -1- and -2- are visible

The brake discs need not be replaced.

2 - Only wear indicator -2- is visible:

The brake discs do not require replacement, but pay attention to the next change

3 - No brake disc wear indicator is visible

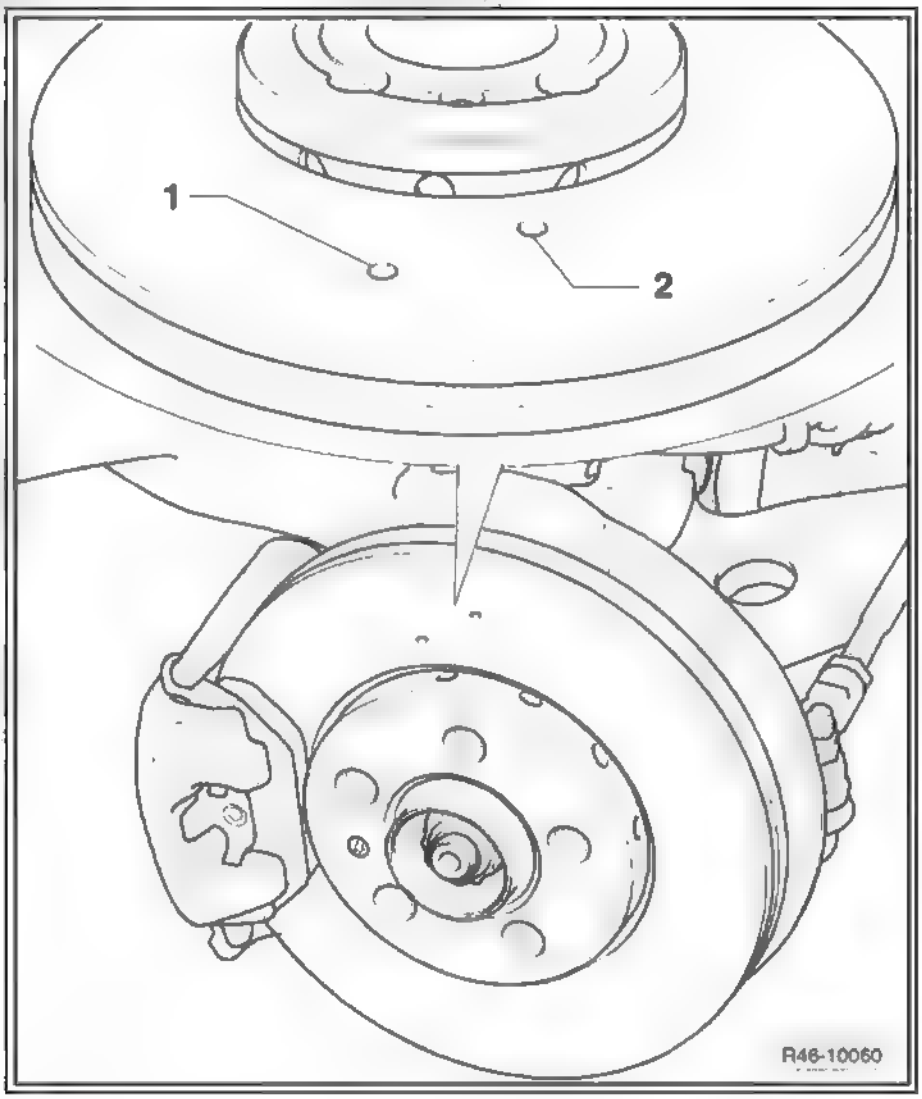
Replace the brake discs

Remove and install the front brake discs

1.7.2 Vehicles with steel wheel

Note

In order to view the brake disc wear indicators (visual check) in vehicles with steel wheels, the front wheels must be removed.



Checking conditions of front brake disc wear:

1 - Wear indicators -1- and -2- are visible

The brake discs need not be replaced

2 - Only wear indicator -2- is visible

The brake discs do not require replacement, but pay attention to the next change

3 - No wear indicator is visible on the brake disc

Replace the brake discs

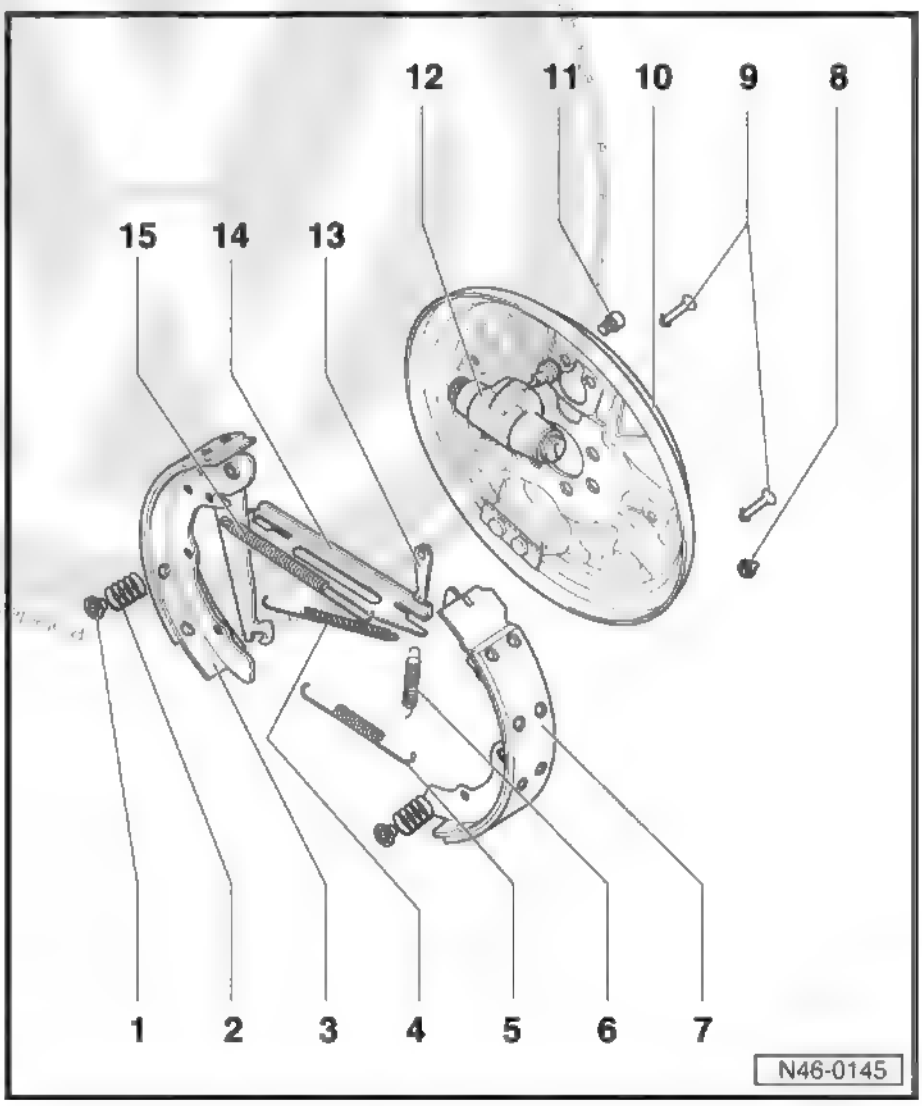
Remove and install the front brake discs

2 Rear wheel brake (drum brake) - repair

2.1 Brake drum - Assembly overview

Note

- *After replacement of the wheel brake cylinder, brake and pad support, release the parking brake and press the brake pedal with force while the vehicle is parked, so that the pads correctly seating for operation.*
- *To draw the braking fluid from its reservoir, always use the Brake filling and bleeding equipment -VAS 5234- or the -V.A.G 1869/4- .*
- *Before removing a brake cylinder, brake bracket or removing a hose, install the Brake pedal compression device -VAG 1869/2- .*



1 - Spring plate
- ❑ In order to remove, press against the compression spring and turn it 90°

2 - Compression spring

3 - Brake shoe with parking brake lever
- ❑ Remove and install ⇒ page 63
- ❑ Adjust the parking brake ⇒ page 68

4 - Upper positioning spring
- ❑ Disengage it by using the Hook -3438-
- ❑ Lubricate the support points with the Grease - G 000 650-

5 - Lower positioning spring
- ❑ Lubricate the support points with the Grease - G 000 650-

6 - Drawspring

7 - Brake shoe
- ❑ Remove and install ⇒ page 63
- ❑ Minimum pad thickness 2.5 mm
- ❑ Check the thickness ⇒ Maintenance with Accuracy

Pads are also supplied without brake shoes

8 - Sealing cap
- ❑ Remove to check brake pad thickness

9 - Elastic pin

10 - Brake support

11 - Hexagon socket head screw
- ❑ 8 Nm

12 - Rear wheel brake cylinder
- ❑ Check the sealing ⇒ page 63

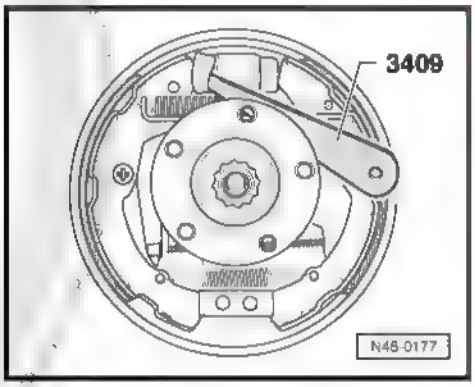
13 - Wedge
- ❑ To remove and install the brake drum, push upwards through a wheel screw hole ⇒ page 63

14 - Operating rod
- ❑ Lubricate the support points with the Grease -G 000 650-

15 - Support spring
- ❑ Disengage it by using the Hook -3438-

Check the brake cylinder for leak proofness

– Remove the sealing caul with the aid of Wedge -3409- .



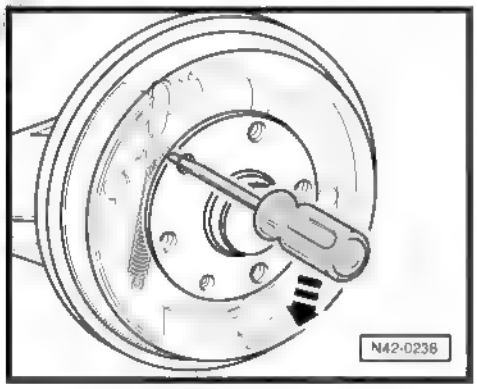
Note

Take care not to damage the seal caul while removing it.

– If there is brake fluid in the seal caul, replace the brake cylinder.

Reposition the brake

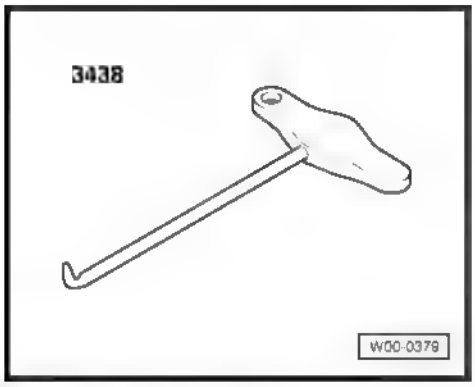
– Press the wedge upward through one of the threaded holes in the brake drum/wheel screws with a screwdriver.



2.2 Brake shoes - remove and install

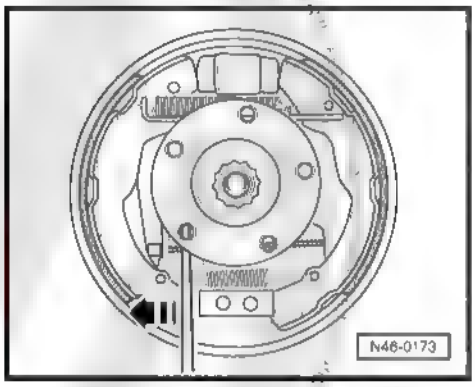
Special tools and workshop equipment required

♦ Hook -3438-

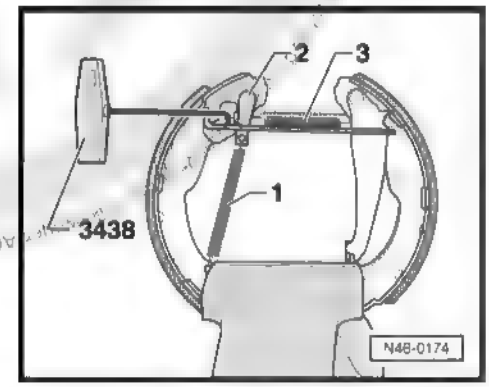


2.2.1 Removal

– Remove the wheels.
– Remove the brake drum.
– Remove the spring plate with the compression springs ⇒ Item 2 (page 62) .
– Disengage the brake shoes towards the -arrow- behind the lower backing plate with the aid of a screwdriver.
– Support the brake shoes on the lower support plate.
– Disengage the lower positioning spring ⇒ Item 5 (page 62) .
– Release the parking brake cable.
– Remove the brake shoes between the wheel hub and the brake support.
– Fasten the brake shoes in a vise.

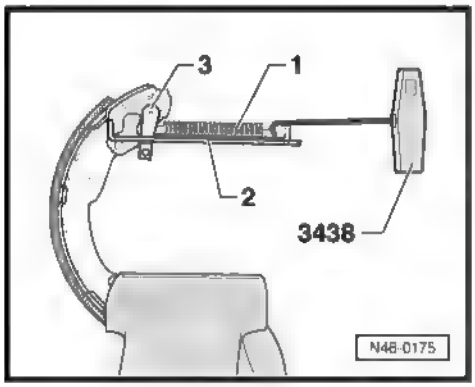


– Remove the drawspring -1- from the wedge -2-.
– Remove the upper positioning spring -3- with Hook -3438- .



– Remove the return spring -1- with Hook -3438- .
– Remove the operating rod -2- and the wedge -3- from the brake shoe.

Solely use alcohol for cleaning the brake system.



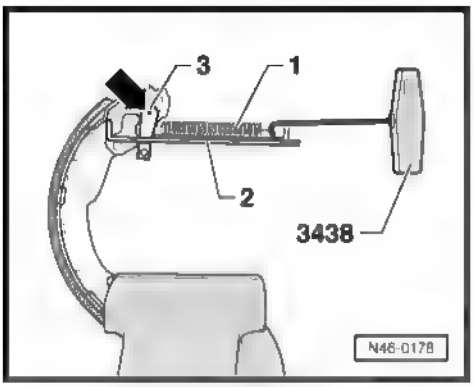
2.2.2 Installation

– Engage the support spring -1- with Hook -3438- on the operating rod -2-.

– Simultaneously place the wedge -3-.

Assembly position: the protuberances -arrow- must remain visible when installing.

– Place the brake shoe with the lever on the operating rod.



– Engage the positioning spring -3- with Hook -3438- .

– Engage the tension spring -1- from the wedge -2-.

– Insert the brake shoes between the wheel hub and the brake support.

– Install the shoes in the brake cylinder plunger.

– Couple the parking brake cable to the brake lever.

– Install the lower positioning spring and ⇒ Item 5 (page 62) disengage the brake shoes behind the lower support.

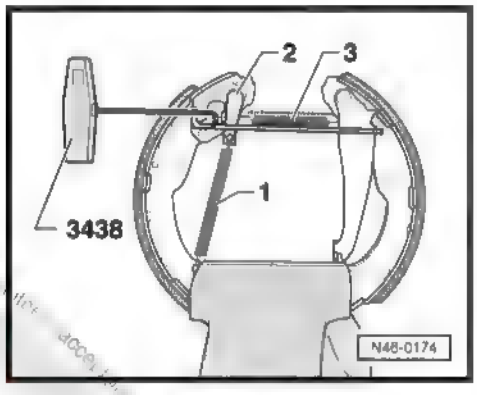
– Install the compression spring ⇒ Item 2 (page 62) with the spring plate.

– Install the brake drum.

– Install the wheels.

– Firmly press the brake pedal.

– Adjust the parking brake ⇒ page 68 .



3 Parking brake - Assembly overview

1 - Parking brake lever knob
- ❑ Remove and install ⇒ Body - internal mountings; Rep. Gr. 68 ; Parking brake lever handle - remove and install

2 - Compensation arch

3 - Adjusting nut
- ❑ Adjust the parking brake ⇒ page 68

4 - Hexagon nut
- ❑ 25 Nm

5 - Rubber cauls

6 - Right guide tube

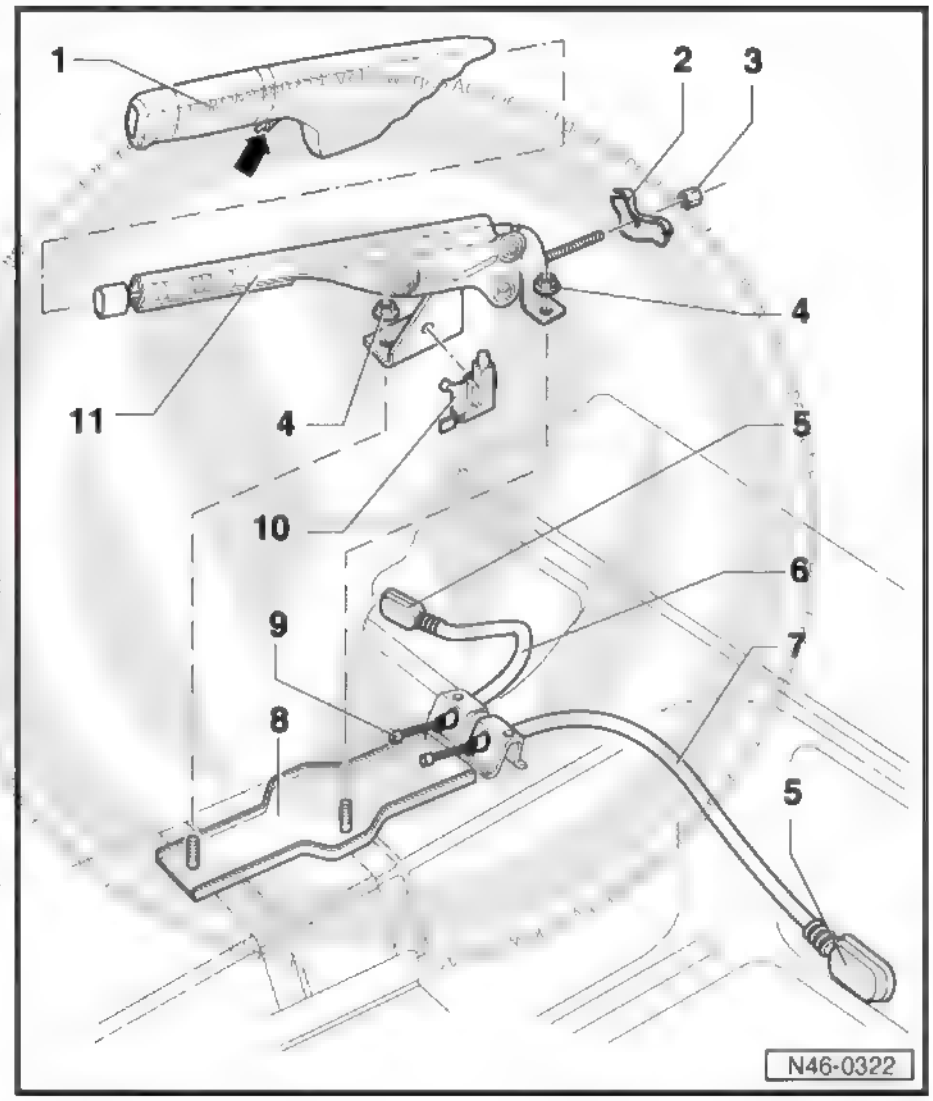
7 - Left guide tube

8 - Parking brake lever support

9 - Parking brake cables
- ❑ Remove and install ⇒ page 66

10 - Parking brake control switch
- ❑ For removal, remove the center console ⇒ Body - internal mountings; Rep. Gr. 68 ; Central console - remove and install

11 - Parking brake lever



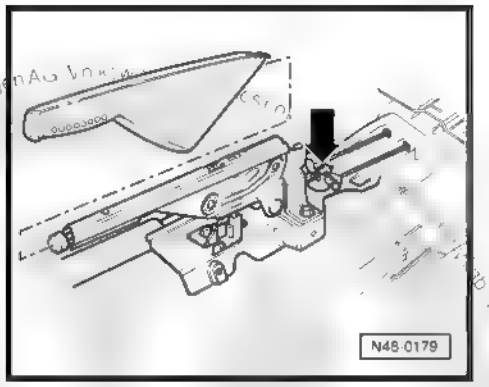
3.1 Parking brake cable (drum brake) - remove and install

3.1.1 Removal

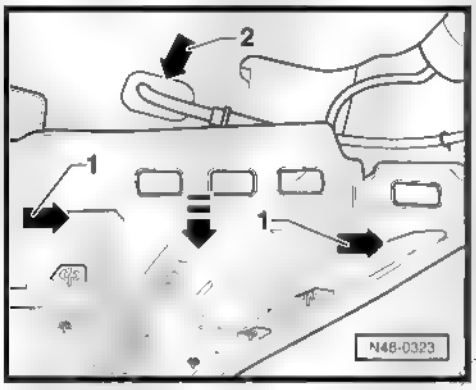
– Remove the handle and the parking brake adjustment cover ⇒ Body - internal mountings; Rep. Gr. 68 ; Parking brake lever handle - remove and install

– Release the parking brake.

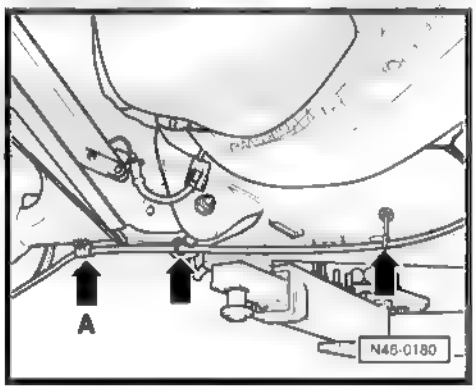
- Loosen nut -arrow- until the parking brake can be removed outwards the compensation footboard.
- Lift the vehicle.



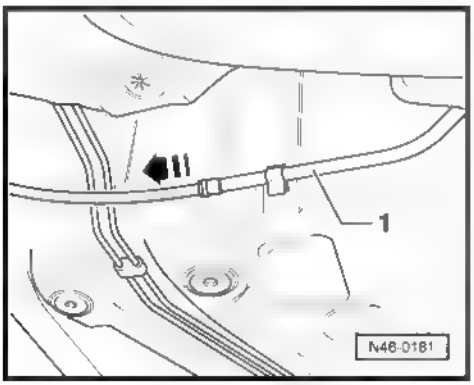
- Unscrew the nuts -1- and push the floor protection downwards until the guide tube -2- from the parking brake cable becomes visible
- Remove the rear wheel.
- Remove the brake drum.
- Release the parking brake cable.



- Detach the parking brake cable from the rear axle body support -arrow A- and hang outwards its supports -arrows-.



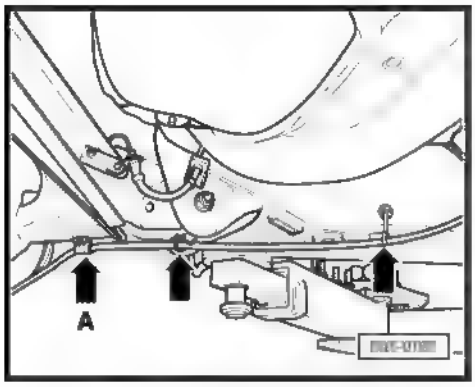
- Pull the parking brake cable towards the -arrow- outwards the guide tube -1-.



3.1.2 Installation

- Insert the parking brake cable into the guide tube.
- Couple the parking brake cable to the brake lever
- Install the brake drum.

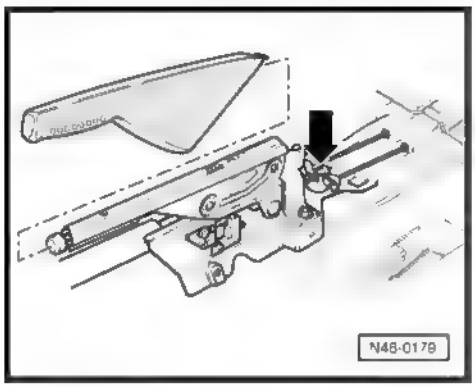
– Attach the parking brake cable into the rear axle body support -arrow A-.



Note

The parking brake cable retainer ring shall be in the middle of the clip.

– Fit the parking brake cable into its respective supports -arrows-.
– Insert the parking brake cable in the compensation arc.
– Previously tighten the parking brake cable with the nut -arrow-.
– Install the wheels.
– Adjust the parking brake ⇒ page 68 .
– Fasten the floor protection.
– Install the knob and the parking brake adjustment cover ⇒ Body - internal mountings; Rep. Gr. 68 ; Parking brake lever handle - remove and install .



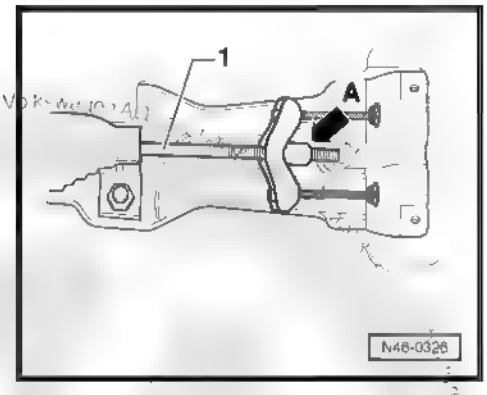
3.2 Parking brake - adjust

- The brake must be operational and bled.

– Remove the handle and the parking brake adjustment cover ⇒ Body - internal mountings; Rep. Gr. 68 ; Parking brake lever handle - remove and install .
– Remove the wheels.
– Reposition the brake ⇒ page 63
– Fully lift the brake wedges.
– Loosen and remove the parking brake cables from the lever compensator.
– Press the brake pedal with a force of approximately 300 N.

- Assemble the cables and tighten the nut -A- until it is no longer possible to turn the wheels manually
- Loosen nut -A- until the wheel turns freely. Slight rubbing is allowed.

The adjusting nut -A- should be screwed above the drawbar end -1-



- Activate the brake lever and check whether turning the wheels is possible or not.

Note

With this procedure, the vehicle will be completely immobilized by activating the lever between the 3rd^{the}. and 4^{the}. tooth.

- Release the parking brake and check that the wheels turn freely, otherwise slightly loosen the nut -A-.

Note

- *A slight rubbing of the pads against the drum is allowed.*
- *After the new adjustment, it is no longer necessary to readjust the parking brake because of the automatic rear wheel brake readjustment.*

4 Brake pedal - Assembly overview

> **WARNING**
>
> *The brake pedal stroke shall not be shortened with additional floor linings.*

Before assembling, all bearing points should be lubricated with Grease -G 000 602- .

1 - Support

2 - Hexagon screw

3 - Hexagon nut
- ❑ Self-locking
- ❑ 28 Nm

4 - Brake light switch -F-
- ❑ Before assembling the Brake light switch -F- , the brake pedal must be fitted with the servo brake actuating rod.
- ❑ Adjust the Brake light switch -F- ⇒ page 74

5 - Accelerator pedal

6 - Brake pedal
- ❑ Remove and install ⇒ page 72

7 - Bearing bushing

8 - Cover

9 - Support pin

10 - Hexagon nut
- ❑ Self-locking
- ❑ 25 Nm

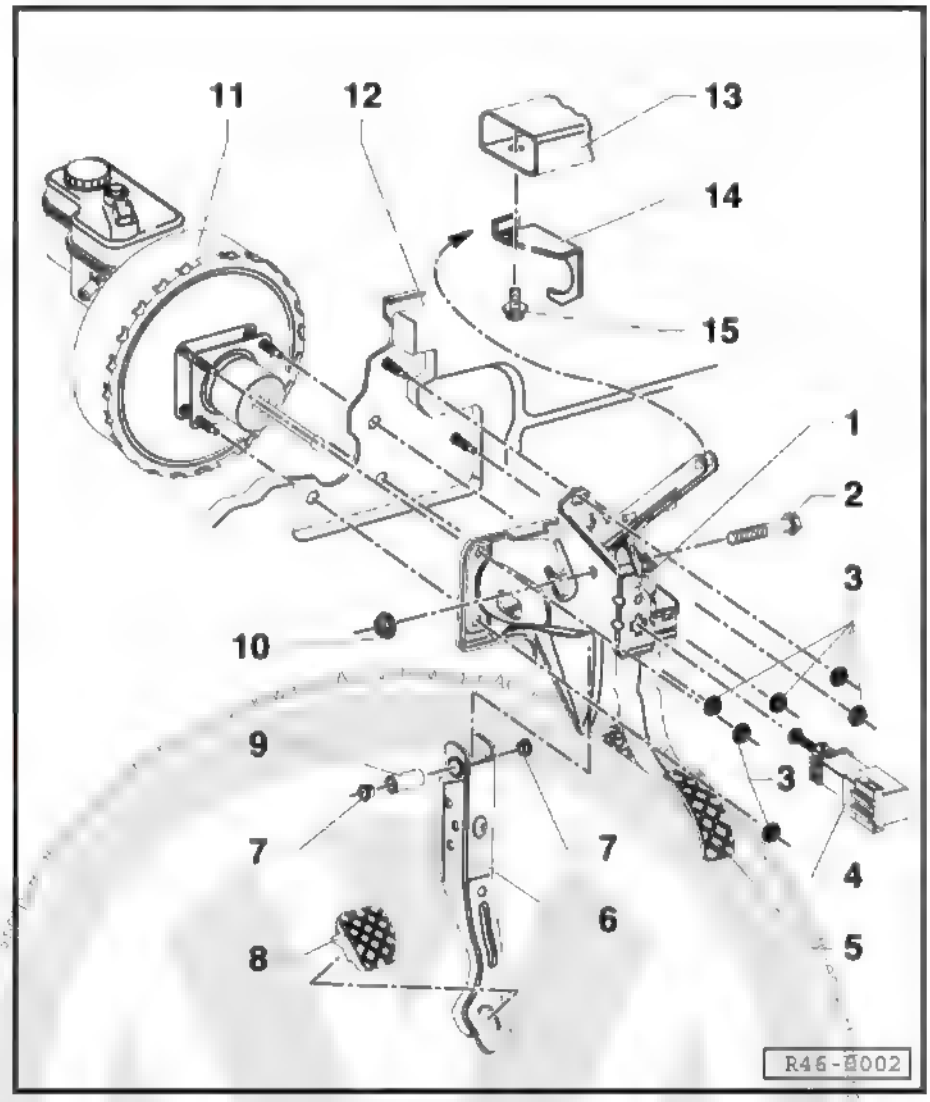
11 - Servo brake

12 - Front panel

13 - Module support

14 - Crash bar anchor

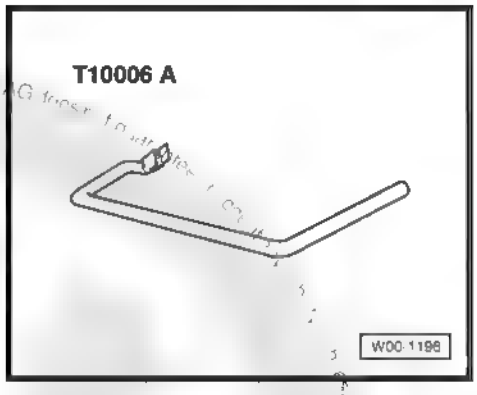
15 - Hexagon screw
- ❑ 10 Nm



4.1 Pedal set - remove and install

Special tools and workshop equipment required

♦ Unlock tool -T10006A-



4.1.1 Removal

– Remove the instrument panel. ⇒ Body - internal mountings; Rep. Gr. 70 ; Instrument panel - remove and install .

– Remove heating baffle ⇒ Heating, air conditioning; Rep. Gr. 80 ; Left footwell air duct - remove and install .

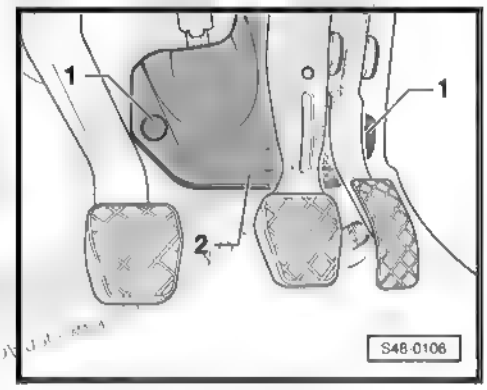
– Loosen the screws -1-

– Remove cover -2-.

– Disengage the accelerator cable.

– On vehicles with accelerator pedal position sensor, release the connector under the instrument panel.

– Remove the Brake light switch -F-, turning it 45° to the left.



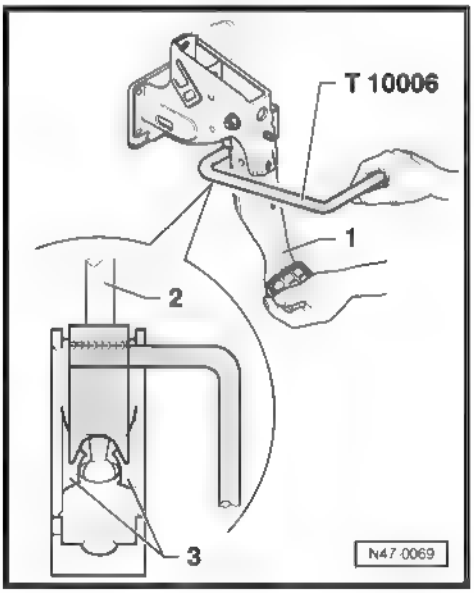
– Then, press and hold the brake pedal towards the servo brake.

1 - Brake pedal

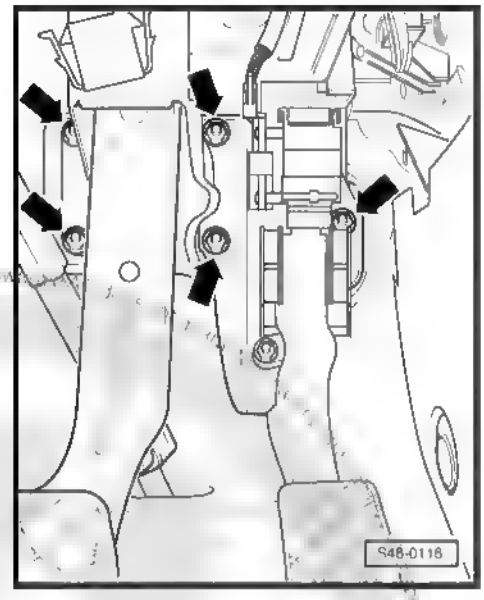
2 - Brake cylinder operating rod

3 - Fastening shoulders

– Position Unlock tool -T10006A- and pull it towards the driver's seat, at the same time hold the brake pedal (at this time, the pedal cannot move backwards). With this, the fastening shoulders -3- of the drive rod's spherical head housing are pressed away from the actuating rod -2-.



– Remove the hexagon nuts -arrows-.



Note

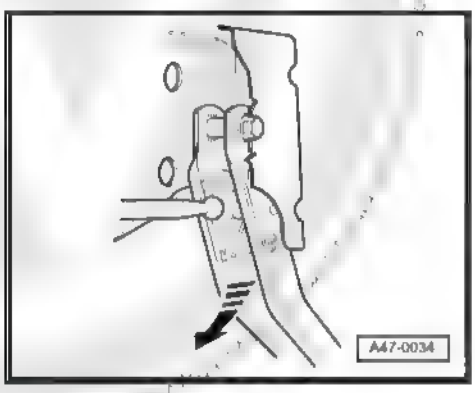
The upper hexagonal nut for fastening the pedal set is not visible in the figure. It is found on the rear wall, behind the impact strut ⇒ Item 3 (page 70)

– Remove the pedal cluster.

4.1.2 Installation

Install by inverting the removal sequence, paying attention to the following:

– Hold the operating rod ball head in front of the housing and press the brake pedal towards the servo brake until the ball head coupling is heard.



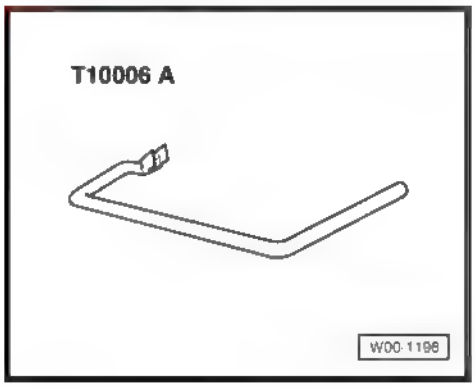
– Hexagon nut tightening torque: 28 Nm.

– Adjust the Brake light switch -F- ⇒ page 74 .

4.2 Brake pedal - remove and install

Special tools and workshop equipment required

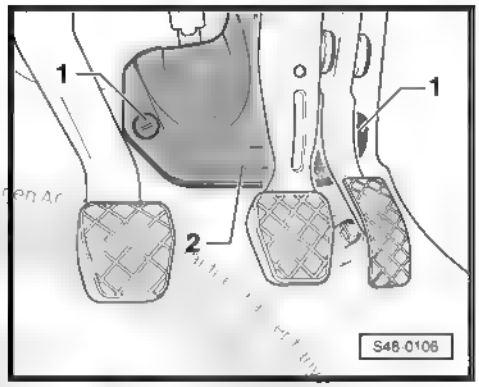
♦ Unlock tool -T10006A-



4.2.1 Removal

– Remove heating baffle ➔ Heating, air conditioning; Rep. Gr. 80 ; Left footwell air duct - remove and install .

- Loosen the screws -1-
- Remove cover -2-
- Disengage the accelerator cable
- On vehicles with accelerator pedal position sensor, release the connector under the instrument panel
- Remove the Brake light switch -F- , turning it 45° to the left



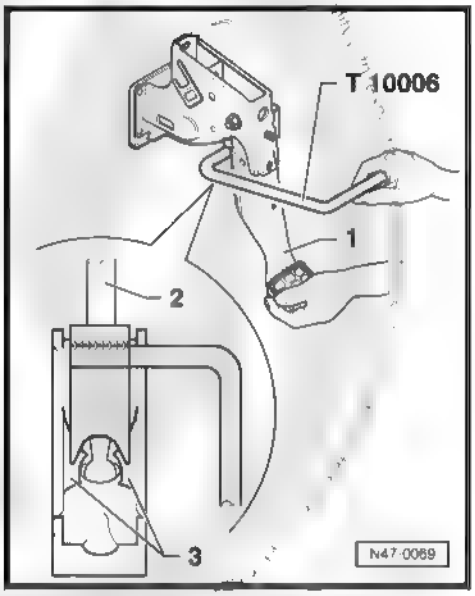
- Then, press and hold the brake pedal to the brake booster direction

1 - Brake pedal

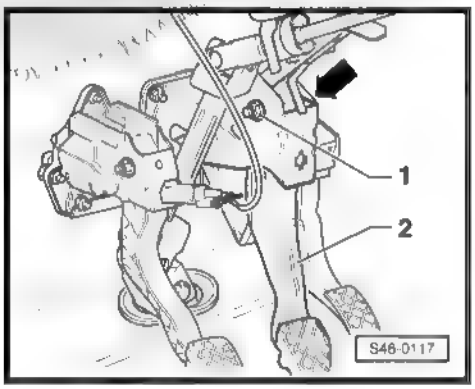
2 - Brake cylinder operating rod

3 - Fastening shoulders

- Position Unlock tool -T10006A- and pull towards the driver's seat. At the same time, hold the brake pedal (at this time, the pedal cannot move backwards). With this, the fastening shoulders -3- of the drive rod's spherical head housing are pressed away from the actuating rod -2-.



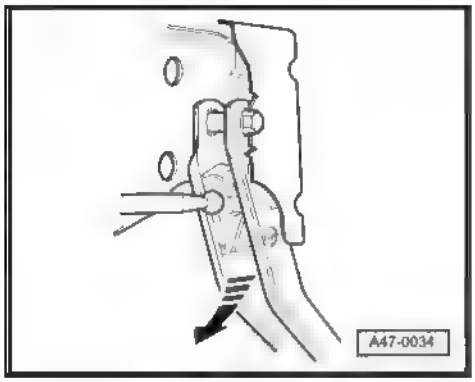
- Loosen the fastening nut -1- and remove the hexagonal head screw -arrow-.
- Remove the brake pedal -2-.



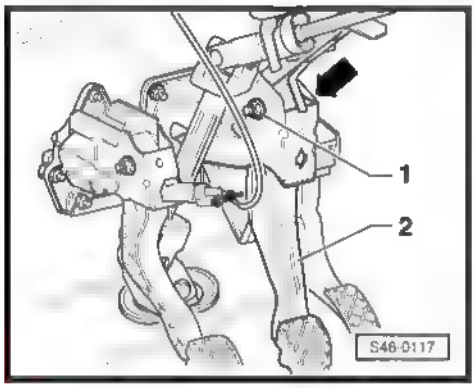
4.2.2 Installation

Install by inverting the removal sequence, paying attention to the following.

– Hold the operating rod ball head in front of the housing and press the brake pedal towards the servo brake until the ball head coupling is heard.



– The tightening torque for the hexagonal nut -1- 25 Nm.
– Adjust the Brake light switch -F- ⇒ page 74 .



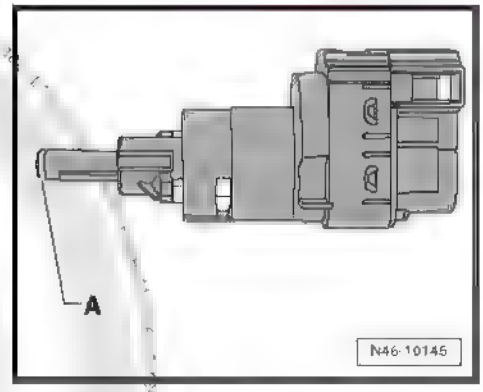
4.3 Brake pedal switch -F47- - remove and install

4.3.1 Removal

– Disconnect the brake light connector.
– Remove the Brake pedal switch -F47- , turning it 45° to the left.

4.3.2 Install and adjust

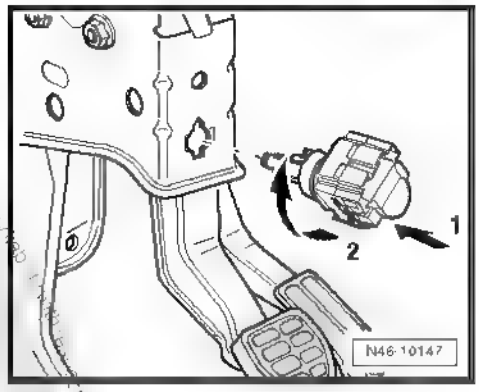
– Before installing, apply Lubricating putty -G 052 142 A2- on the rod tip, area -A-. Refer to the ⇒ Chemical Materials Manual .



Note

The installation of the Brake pedal switch -F47- must be carried out with the brake pedal in its resting position. The brake pedal may not be activated before the end of the procedure.

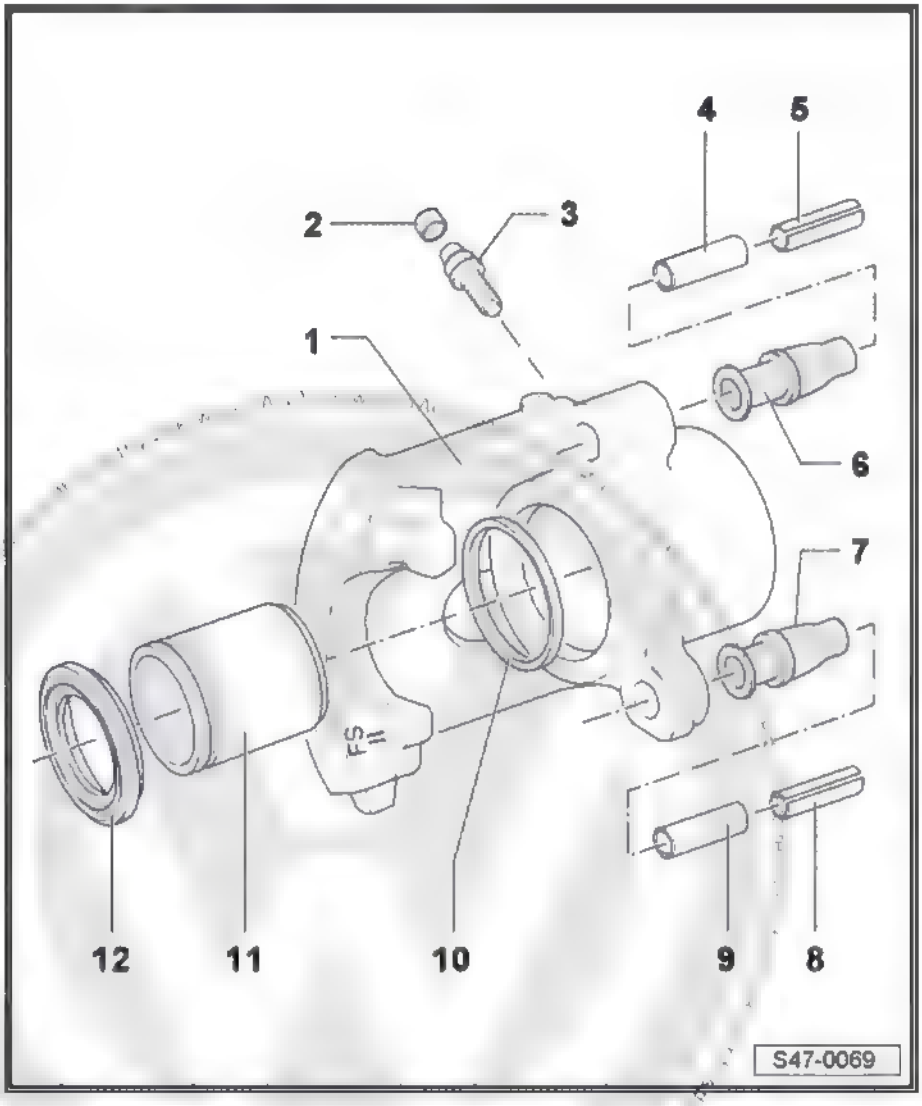
- Introduce the Brake pedal switch -F47- in its respective housing, pressing it lightly against the brake pedal -arrow 1- and fasten it by turning it by 45° to the right -arrow 2-.
- Engage the connector Brake pedal switch -F47- .
- Press the brake pedal and check whether the brake light (rear of vehicle) lights.



47 – Brakes - Hydraulic system, servo brake

1 Front brake caliper (FS II) - repair

- In case of repairs, install the full repair set.
- New brake calipers are supplied with brake fluid and previously bled.
- Apply a light coat of Grease -G 052 150 A2- on the brake cylinder, plungers and sealing ring. ⇒ Refer to Chemicals Manual .



1 - Brake caliper housing

2 - Protection cover
- ❑ Fit the bleed valve

3 - Bleeder valve
- ❑ 10 Nm
- ❑ Before installing, apply a thin layer of Grease -G 052 150 A2- on the thread

4 - Upper spacer sleeve
- ❑ Assemble with Grease -G 052 150 A2-

5 - Upper bushing
- ❑ Assemble with Grease -G 052 150 A2-

6 - Upper sleeve
- ❑ Fit on the brake caliper

7 - Lower sleeve
- ❑ Fit on the brake caliper

8 - Lower bushing
- ❑ Assemble with Grease -G 052 150 A2-

9 - Lower spacer sleeve
- ❑ Assemble with Grease -G 052 150 A2-

10 - Seal ring
- ❑ Remove it with a ?assembly Wedge -3409-

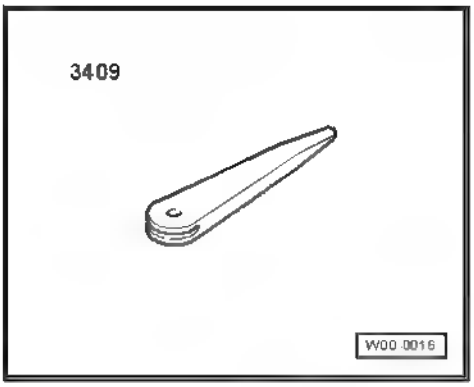
11 - Plunger
- ❑ Remove and install ⇒ page 77
- ❑ Prior to installation, apply a slight coat ?of Grease -G 052 150 A2-

12 - Protection cover
- ❑ Do not damage the plunger while installing it

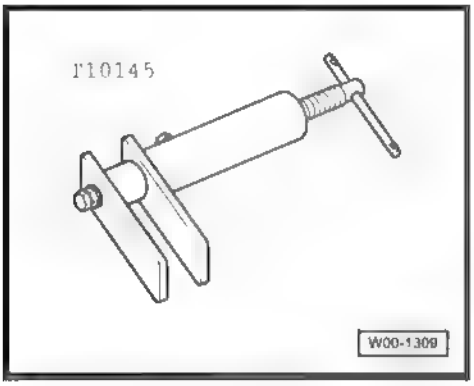
1.1 Plunger for front brake caliper - remove and install

Special tools and workshop equipment required

- ?assembly Wedge -3409-



- Plunger resetting device -T10145-

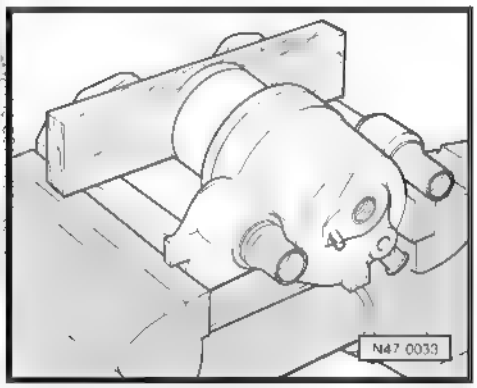


1.1.1 Removal

– Remove the brake caliper housing plungers with compressed air.

Note

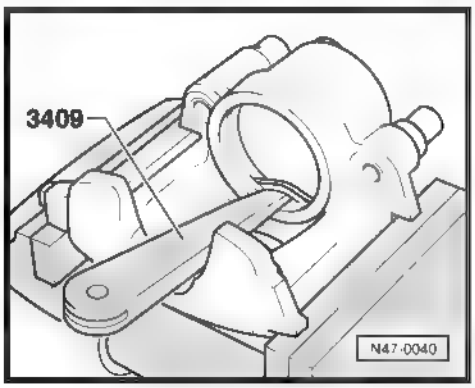
Place a wooden plate in the area so that the plunger is not damaged.



– Remove the sealing ring with the ?assembly Wedge -3409-.

Note

While removing, make sure that the cylinder surface is not damaged.

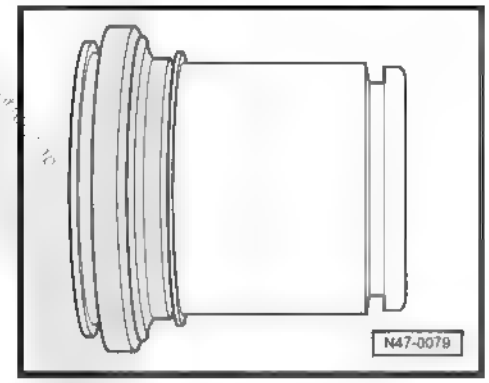


1.1.2 Installation

Note

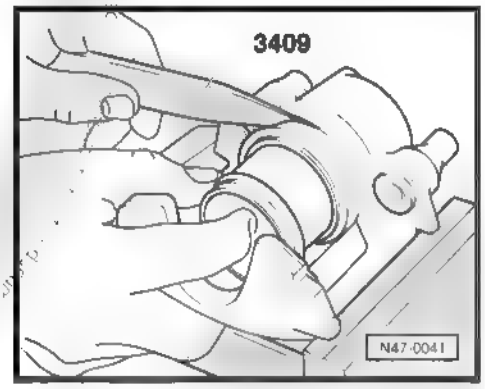
Clean the plunger surfaces and seal ring with alcohol only and dry them immediately afterwards.

- Apply a light coat of Grease -G 052 150 A2- to the plunger and sealing ring
- Install the seal ring on the brake caliper housing
- Install the protection cover with its outer seal lip over the plunger.



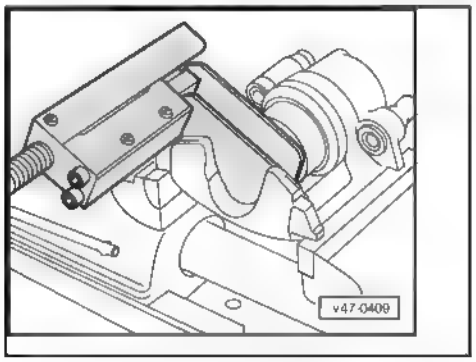
- Install the internal lip in the cylinder groove using the ?assembly Wedge -3409- .

Hold the plunger in front of the brake caliper housing.



- Press the plunger with the Plunger resetting device -T10145- inward the brake caliper case.

The external protection cover lip fits into the plunger groove.



2 Front brake caliper, brake caliper (FS II) - repair

- In case of repairs, install the full repair set.
- New brake calipers are supplied with brake fluid and previously bled
- Apply a light coat of Grease -G 052 150 A2- on the brake cylinder, plungers and sealing ring. ⇒ Refer to Chemicals Manual

1 - Protection cover
- ❑ Fit the bleed valve

2 - Bleeder valve
- ❑ 10 Nm
- ❑ Before installing, apply a thin layer of Grease -G 052 150 A2- on the thread

3 - Support sleeve
- ❑ Fit on the brake caliper

4 - Guide pin
- ❑ 30 Nm

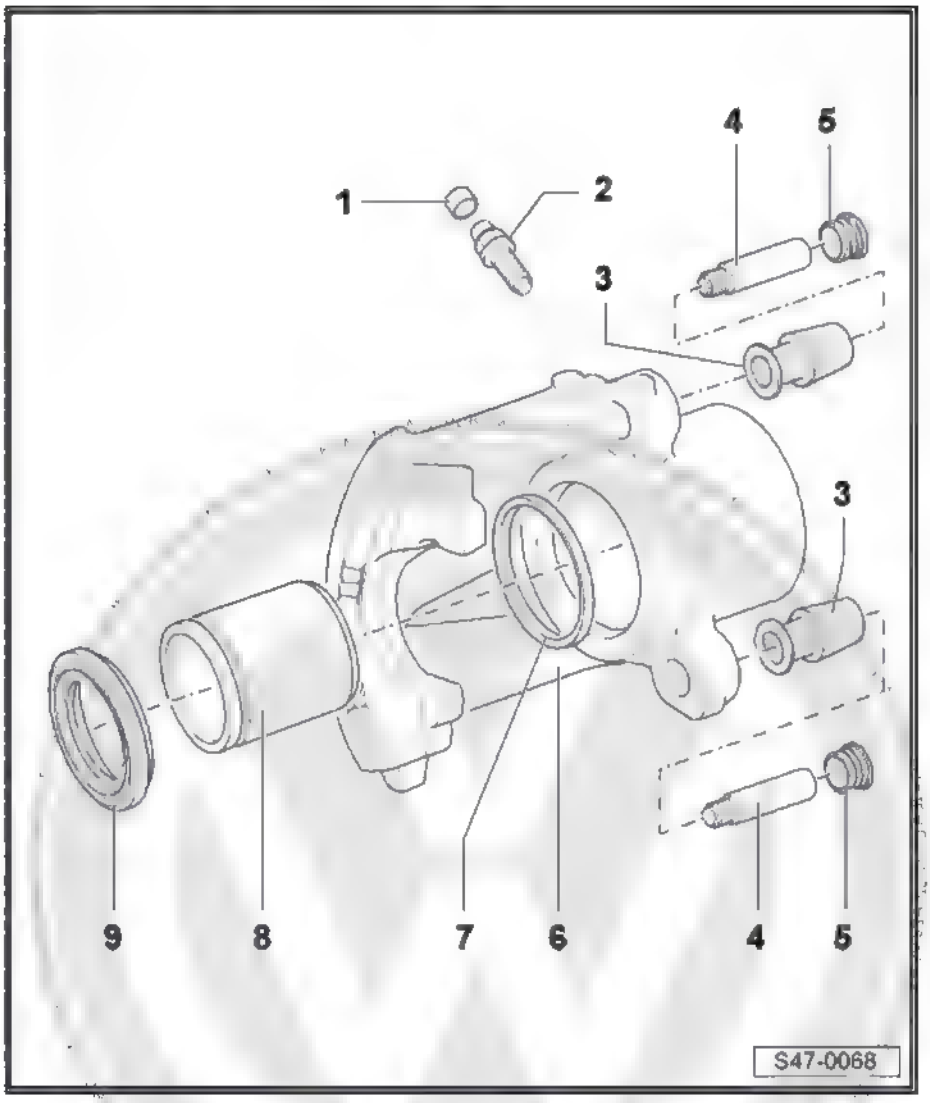
5 - Cover cap
- ❑ Assemble to support sleeve

6 - Brake caliper housing

7 - Seal ring
- ❑ Remove and install ⇒ page 79

8 - Plunger
- ❑ Remove and install ⇒ page 79
- ❑ Prior to installation, apply a slight coat ?of Grease -G 052 150 A2-

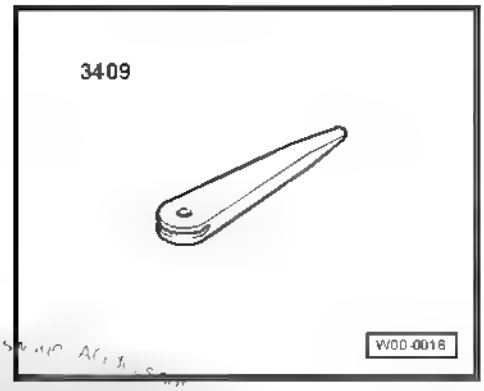
9 - Seal ring
- ❑ Remove and install ⇒ page 79



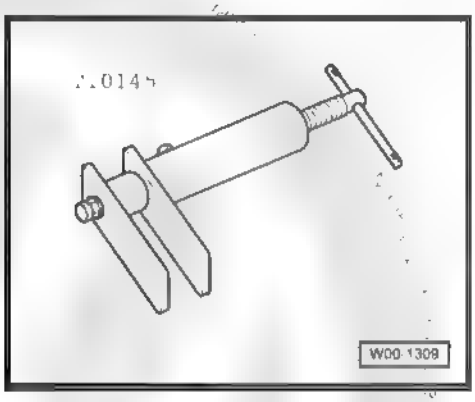
2.1 Front brake caliper plunger - remove and install

Special tools and workshop equipment required

♦ ?assembly Wedge -3409-

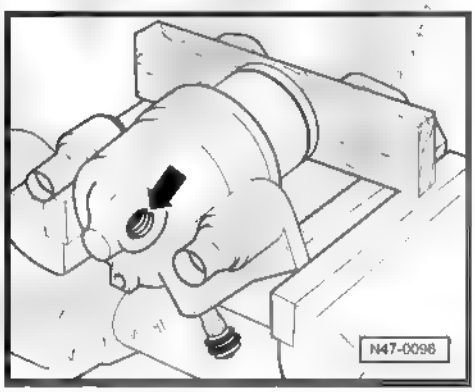


♦ Plunger resetting device -T10145-



2.1.1 Removal

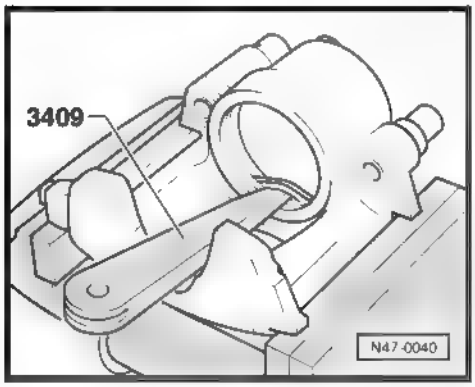
– Remove the brake caliper housing plungers with compressed air.



Note

Place a wooden plate in the area so that the plunger is not damaged.

– Remove the sealing ring with the ?assembly Wedge -3409- .



Note

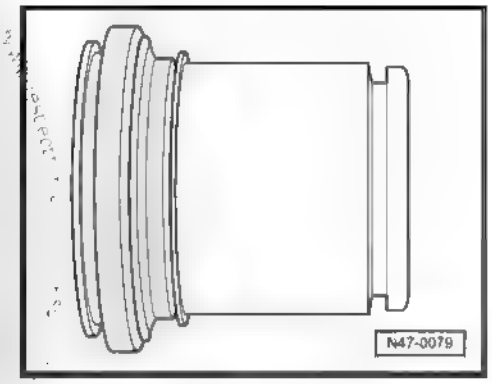
While removing, make sure that the cylinder surface is not damaged.

2.1.2 Installation

Note

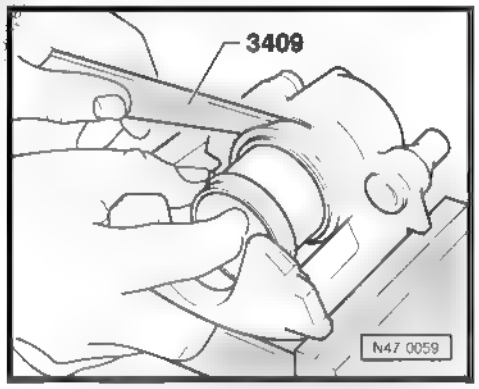
Clean the plunger surfaces and seal ring with alcohol only and dry them immediately afterwards

- Apply a light coat of Grease -G 052 150 A2- to the plunger and sealing ring
- Install the seal ring on the brake caliper housing.
- Install the protection cover with its outer seal lip over the plunger.



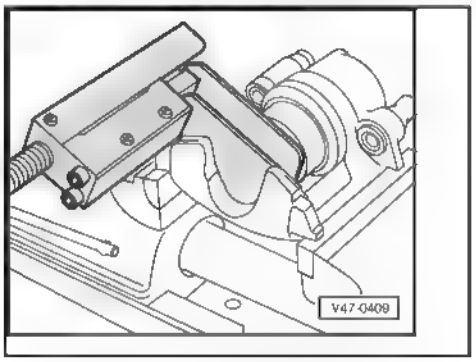
- Install the internal lip in the cylinder groove using the ?assembly Wedge -3409- .

Hold the plunger in front of the brake caliper housing.



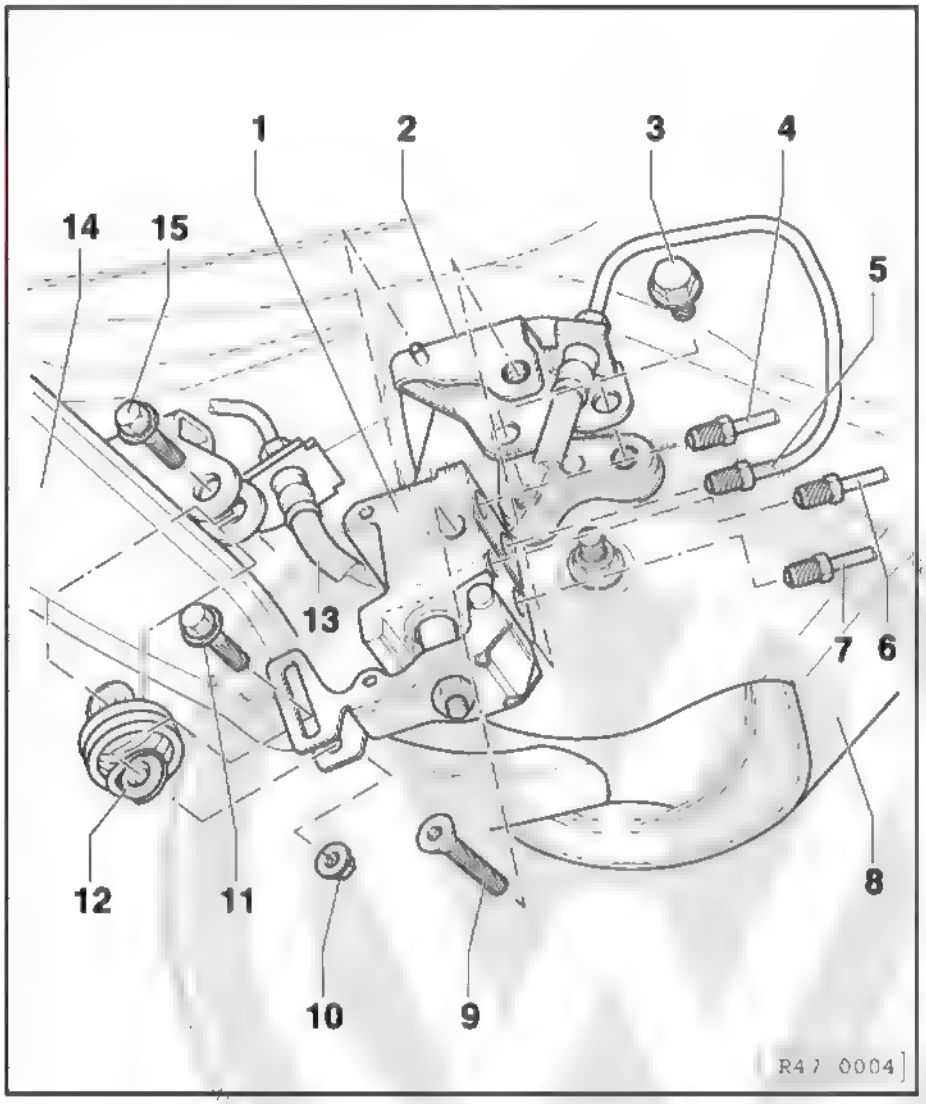
- Press the plunger with the Plunger resetting device -T10145- inward the brake caliper case.

The external protection cover lip fits into the plunger groove.



3 Braking power adjustment - Assembly overview

Only for vehicles without ABS.



1 - Braking power adjustment
- ❑ Adjust ⇒ page 82
- ❑ Check ⇒ page 83

2 - Support

3 - Hexagon nut
- ❑ Self-locking
- ❑ 17 Nm

4 - Brake pipe connection
- ❑ ?Right rear wheel brake cylinder
- ❑ 14 Nm

5 - Brake pipe connection
- ❑ ?Left rear wheel brake cylinder
- ❑ 14 Nm

6 - Brake pipe connection
- ❑ Brake master cylinder/ floating plunger circuit to the hydraulic unit
- ❑ 14 Nm

7 - Brake pipe connection
- ❑ Brake master-cylinder/ pressure plunger circuit to the hydraulic unit
- ❑ 14 Nm

8 - Retaining support

9 - Hexagon socket head screw
- ❑ 20 Nm

10 - Hexagon screw

11 - Nut
- ❑ 20 Nm

12 - Drawspring

13 - Brake hose

14 - Axle beam

15 - Hexagon screw
- ❑ 16 Nm

3.1 Brake pressure regulator - adjust

Perform the adjustments according to the following conditions.

- Excessively high testing pressure on the rear axle:

– Relieve the adjustment spring.

- Excessively low testing pressure on the rear axle:

– Tension the adjustment spring.

Note

The regulator spring shall be never relieved or tensioned with the activated brake pedal

Proceed according to the following sequence:

– Check the brake pressure regulator ⇒ page 83 .

– Adjust the spring.

– Check the values again ⇒ page 83 .

– If necessary, re-make the adjustment.

3.2 Brake pressure regulator - check

Special tools and workshop equipment required

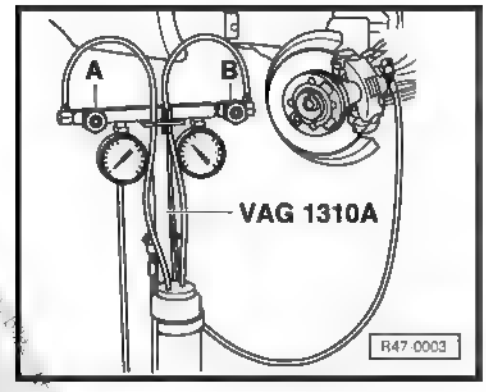
♦ Control equipment for brake systems -V.A.G 1310 A-

Check conditions:

- Fuel tank is completely filled
- Driver's weight approximately 75 Kg
- Spare wheel and tools in the respective assembly position in the vehicle
- Windshield washer system container is completely filled

– Lift the vehicle on a board-type elevator or use a trench.

- Remove the cylinder bleeding screws and install the adapters for the Control equipment for brake systems -V.A.G 1310 A- diagonally, the front left wheel cylinder with the right rear wheel cylinder, or the right front wheel cylinder with the left rear wheel cylinder
- Bleed the equipment through the cocks -A- and -B-.



WARNING

Do not allow lack of brake fluid in the reservoir.

- Apply the brake pedal until the front wheel pressure gauge indicates 70 bar and compare it to the values obtained on the rear wheel according to the specified values.

Version	Bar		
Drum brake in the rear axle	Front axle	70	100
	Rear axle	35,6 ... 41,6	48,5 ... 54,5

- Repeat the check for 100 bar.
- When the values do not correspond to those specified and the system does not present any leakages or other abnormalities, adjust the pressure regulator again. If the values remain different from the specification values, replace the regulator.
- Remove Control equipment for brake systems -V.A.G 1310 A- and bleed the brake system ⇒ page 85 .

WARNING

- *Never reuse drained fluid.*

4 Brake system - bleed

WARNING

- *Use only new brake fluid, in accordance with standard US FMVSS 116 DOT 4.*
- *The original VW/Audi brake fluid corresponds to this specification.*
- *The brake fluid is toxic. Due to its acidic properties it should not come into contact with painted surfaces.*
- *Brake fluid is hygroscopic, i.e. it absorbs environmental humidity and shall always be stored in air tight containers.*
- *Wash brake fluid leakages with plenty of water.*

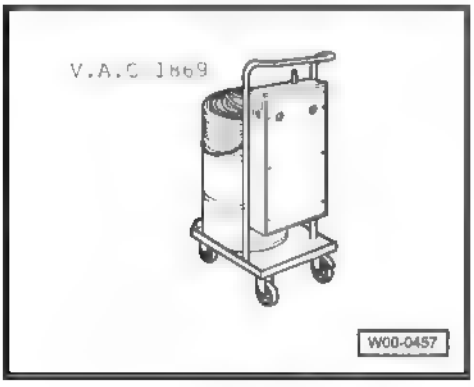
4.1 Brake system - Bleed with brake replenishment and bleed equipment

Special tools and workshop equipment required

- Brake filling and bleeding equipment -VAS 5234-

or

- Brake filling and bleeding equipment -V.A.G 1869-



- Accessory set for bleeder -V.A.G 1869/4-

Note

On vehicles equipped with ABS/EDS/ASR, the system shall be bled when the brake fluid reservoir is completely empty (e.g., brake system leakages) *➢ page 86*

– Connect the Brake filling and bleeding equipment -VAS 5234- or -V.A.G 1869- .
– Open the bleed valves in the following sequence and bleed the brake cylinder/caliper

Bleeding sequence for Bosch 5.7, 8.0 and 8.2

1 - Right rear brake cylinder/caliper

2 - Left rear brake cylinder/caliper

3 - Right front brake caliper

4 - Left front brake caliper

– Keep the bleed valves open with the hose connected until the fluid comes out without any air bubbles.

After bleeding, perform a test drive carrying out at least one ABS regulated braking!

4.2 Brake system - Bleed without brake replenishment and bleed equipment

In order to do the bleeding without using the Brake filling and bleeding equipment -V.A.G 1869- or -V.A.G 1869- it is required the aid of a second person.

– Firmly press and hold brake pedal.
– Open the bleeding valve.
– Apply the brake pedal until its end stop.
– Close the valve while pressing the brake pedal.
– Slowly release the brake pedal.

This bleed procedure shall be performed 5 times per brake cylinder/caliper.

– Open the bleed valves in the following sequence:

1 - Right rear brake cylinder/caliper

2 - Left rear brake cylinder/caliper

3 - Right front brake caliper

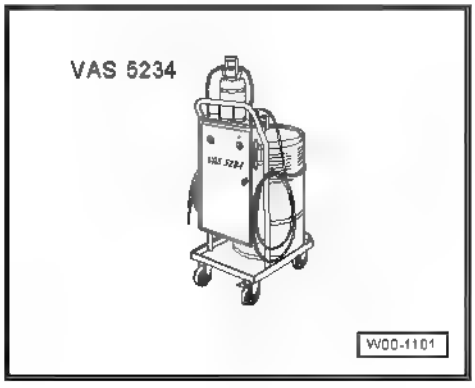
4 - Left front brake caliper

After bleeding, perform a test drive carrying out at least one ABS regulated braking!

4.3 Brake system with ABS/EDS/ASR - Bleed when the reservoir is empty

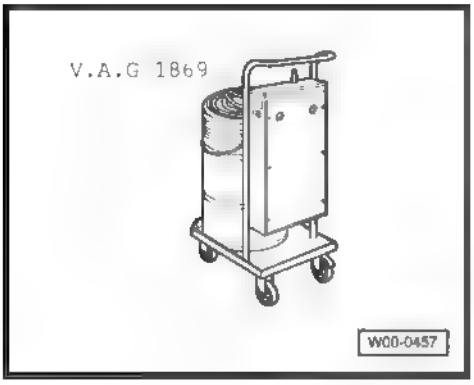
Special tools and workshop equipment required

♦ Brake filling and bleeding equipment -VAS 5234-



or

- Brake filling and bleeding equipment -V.A.G 1869-



- Accessory set for bleeder -V.A.G 1869/4-

– Connect the Brake filling and bleeding equipment -VAS 5234- or -V.A.G 1869- .

– Open the bleed valves in the following sequence and bleed the brake cylinder/caliper.

1 - Simultaneously bleed the left and right front brake calipers

2 - Simultaneously bleed the left and right brake calipers/cylinders

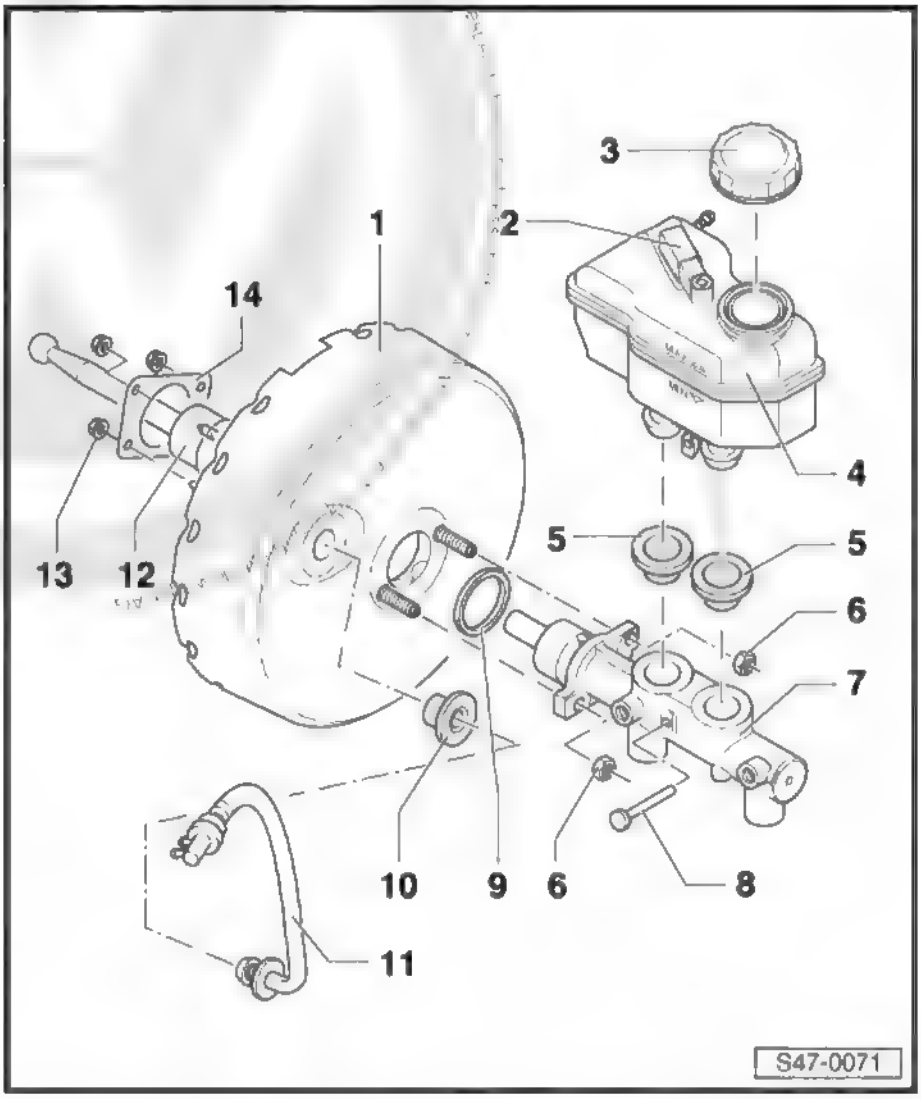
– Keep the bleed valves open with the hose connected until the fluid comes out without any air bubbles.

Then, the hydraulic unit must be bled once again, by means of the Diagnosis, Measurement and Information System -VAS 5051A/52- in the function "Basic adjustment".

After bleeding, perform a test drive carrying out at least one ABS regulated braking!

5 Brake booster/brake master cylinder - Assembly overview

The brake cylinder and the servo brake can be independently replaced



1 - Servo brake

- ❑ On gasoline engines, the required vacuum is taken from the intake manifold
- ❑ On ??diesel engines, there is a vacuum pump for vacuum transformation
- ❑ Check the operation:
  - – Fully press the brake pedal several times with the engine turned off (this eliminates any remaining vacuum inside the servo-brake).
  - – Hold the brake pedal with average strength at braking position and turn the engine on. A fully operational servo brake may be sensed when the operator's feet is on the pedal (active multiplication).
  - – In case of faults, completely replace the servo brake.
- ❑ Verify the check valve (in the vacuum hose) ⇒ page 91
- ❑ Remove and install ⇒ page 94

2 - Brake oil level warning contact -F34-

3 - Cover

4 - Brake fluid reservoir

5 - Sealing plug

- ❑ Moist with brake fluid and press into the brake master cylinder

6 - Hexagon nut

- ❑ Self-locking
- ❑ 20 Nm

7 - Brake cylinder

- ❑ Cannot be repaired. In case of fault, replace it completely
- ❑ Remove and install ⇒ page 92

8 - Retaining pin for the brake fluid reservoir

- ❑ Insert through the brake master cylinder

9 - Seal ring
- ❑ Replace whenever the master cylinder is removed

10 - Sealing plug
- ❑ Connection for vacuum hose

11 - Vacuum hose

12 - Caul
- ❑ Watch for proper seating, as there may occur aspiration noises

13 - Hexagon nut
- ❑ Self-locking
- ❑ 28 Nm

14 - Sealing
- ❑ To servo brake

5.1 Servo brake vacuum pump (diesel vehicles) - remove and install

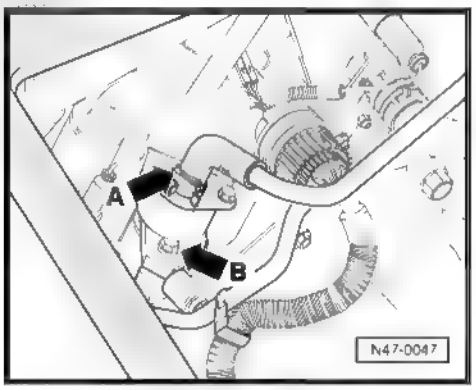
5.1.1 Vacuum pump for 4-cylinders diesel engines and with distribution injector pump

Removal

– Loosen the fastening clamp -arrow A- from the vacuum hose, disconnect the hose.

– Loosen the screw -arrow B- on the head flange.

– Remove the vacuum pump.



Seal the vacuum pump

1 - Hexagonal head screw

2 - Cover

3 - O-Ring

- replace

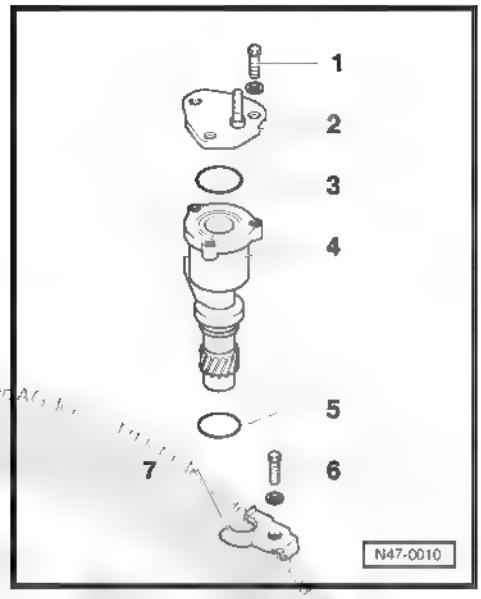
4 - Vacuum pump

5 - O-Ring

- replace

6 - Hexagonal head screw, 20 Nm

7 - Support

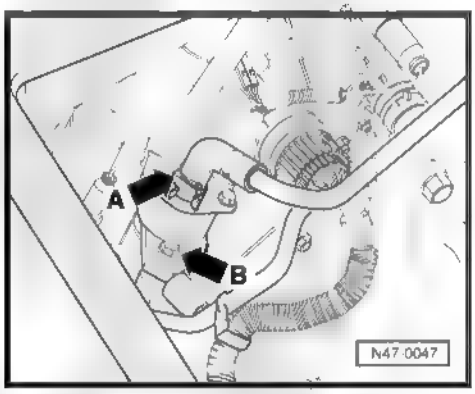


- It is not possible to repair the vacuum pump.
- To seal, replace the two O-Rings pos. 3 and 5.

Installation

When installing the vacuum pump, ensure the proper fitting to the driving gear.

– Fasten the screw -arrow B- to the flange and install the vacuum hose with the clamp -arrow A-.



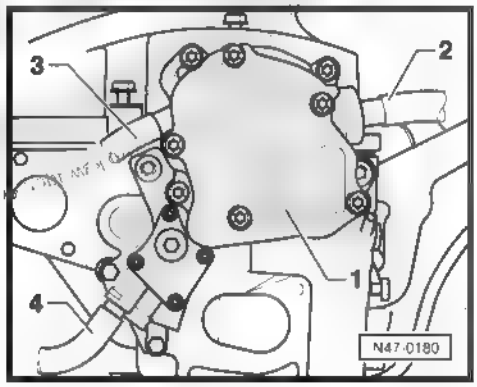
5.1.2 Vacuum pump for 3-cylinder diesel engines

Tandem pump -1- (vacuum pump and fuel pump).

Vacuum hose -2- to servo brake with check valve.

Fuel tube sets -3- and -4-

– Remove and install⇒ Rep. Gr. 20 ; Fuel supply system components - remove and install .



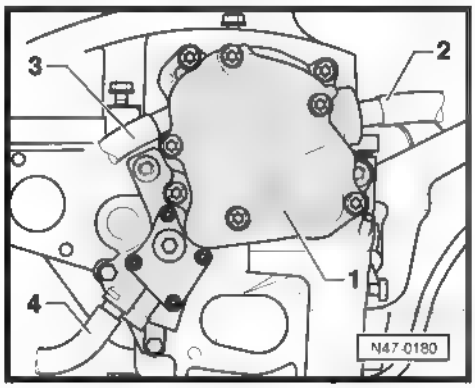
5.1.3 Vacuum pump for 4-cylinder diesel engines with injector pump unit

Tandem pump -1- (vacuum pump and fuel pump).

Vacuum hose -2- to servo brake with check valve.

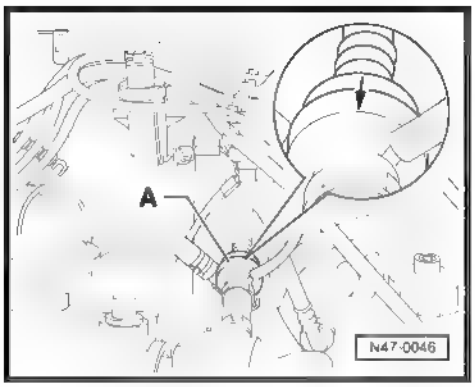
Fuel tube sets -3- and -4-.

– Remove and install ➢ Rep. Gr. 20 ; Fuel supply system components - remove and install; .



5.2 Check valve - check

– Inspect the check valve -A-



Air must pass through the valve in the arrow direction.

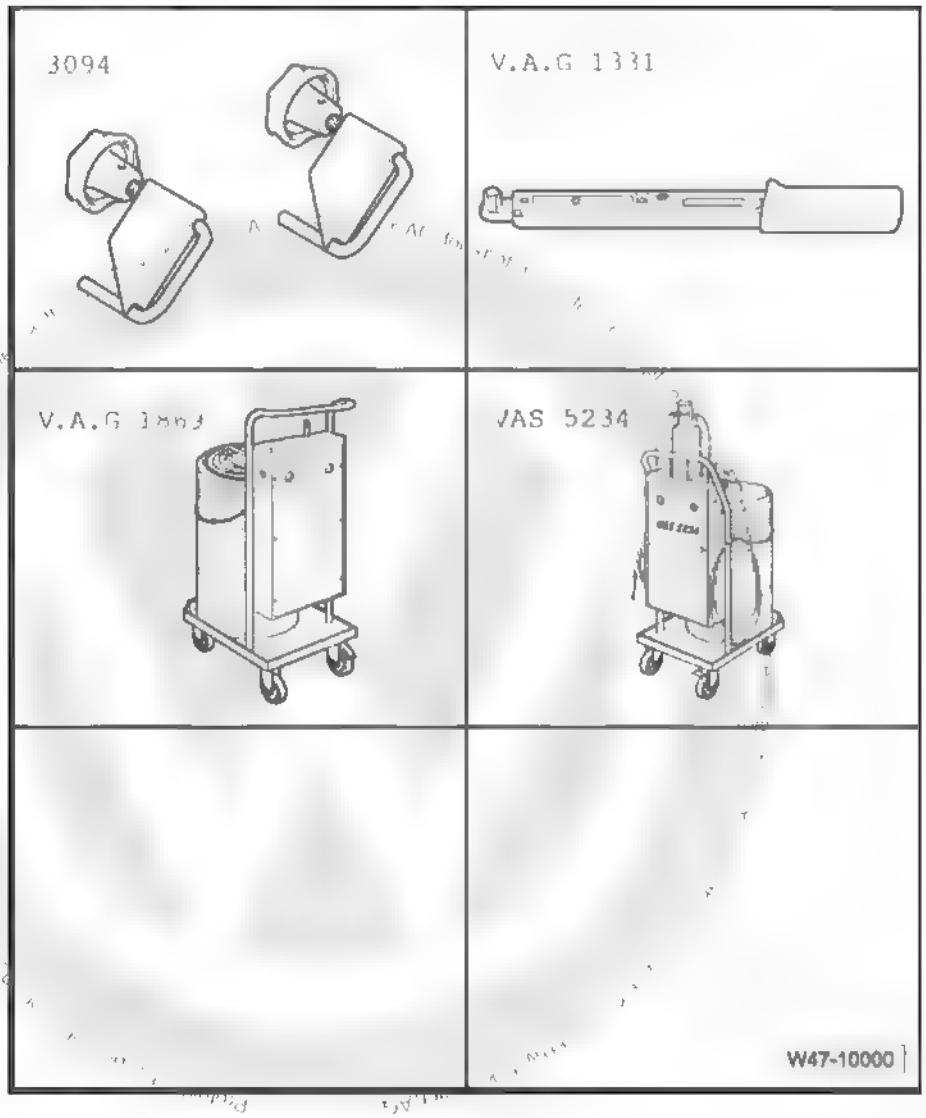
The valve must remain closed in the opposite direction

Pay attention to the correct assembly position

6 Brake cylinder - remove and install

Special tools and workshop equipment required

- Clamps (diam. 25 mm) -3094-
- Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-
- Brake pedal compression device -VAG 1869/2-
- Brake filling and bleeding equipment -V.A.G 1869-
- Brake replenishment and bleed equipment -VAS 5234-



6.1 Removal

– Disconnect the battery ⇒ Electrical equipment; Rep. Gr. 27 ; Battery - disconnect and connect .

Note

- *Check whether the vehicle has a coded radio. If so, request the anti-theft code before disconnecting the battery earth strap.*
- *When the battery is reconnected, check the operation of the vehicle electrical system (radio, clock and electric door and window locks, etc.) according to the Workshop Manual and/or instructions for use.*

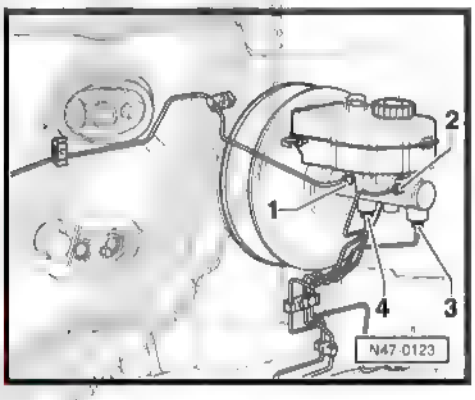
– Place an adequate number of lint-free cloths in the area around the water reservoir, engine and transmission.

- Draw as much brake fluid as possible from the reservoir by using Brake replenishment and bleed equipment -VAS 5234- or -V.A.G 1869/4- .
- Close the clutch cylinder return hose with the Clamp (diam. 25 mm) -3094- .
- Disconnect the clutch cylinder return hose
- Disconnect the connector of the Brake oil level warning contact -F34- .
- Release the brake lines in the brake master cylinder and close them with the plugs of Repair set of plugs 1H0 698 311 A.
- Release the brake cylinder nuts.
- Carefully remove the servo brake cylinder.

6.2 Installation

Install by inverting the removal sequence, paying attention to the following:

- When joining the brake cylinder to the servo brake, ensure the operating rod is properly seated in the brake cylinder.
- Tighten the nuts on the master cylinder with 20 Nm.
- Tightening torque for the brake pipes 14 Nm.
- Connect the master cylinder piping:



Vehicles without ABS

1 - Right front brake tube

2 - Left front brake tube

3 - Rear break tube for breaking power adjuster ⇒ page 82

4 - Rear break tube for breaking power adjuster ⇒ page 82

Vehicles with ABS 5.7 ⇒ page 13

Vehicles with ABS 8.0 ⇒ page 23

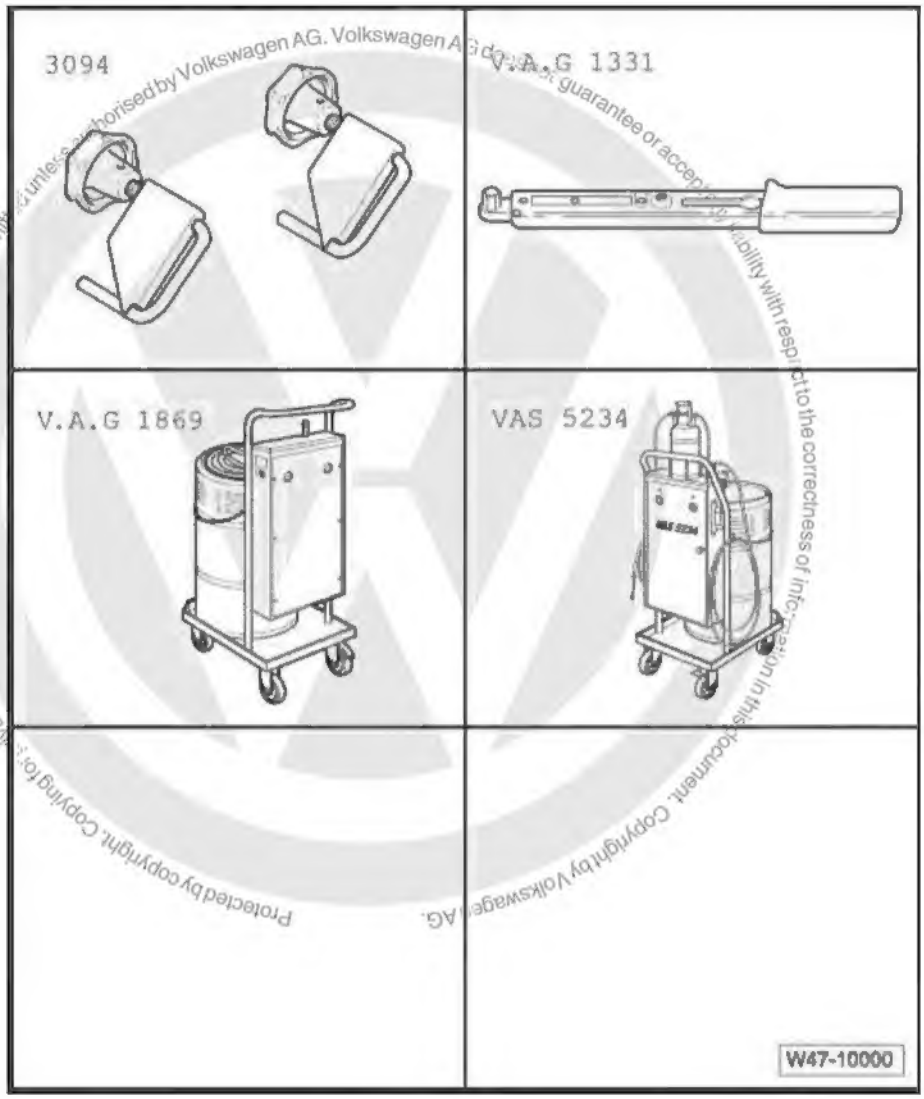
Vehicles with ABS 8.2 ⇒ page 23

- Bleeding brake system ⇒ page 85 .

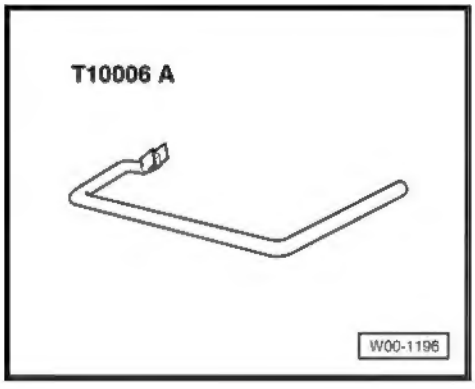
7 Servo brake - remove and install

Special tools and workshop equipment required

- Clamps (diam. 25 mm) -3094-
- Torque wrench - 5 to 50Nm (socket 1/2") -VAG 1331-
- Break bleeding device - V.A.G 1869-
- Brake replenishment and bleed equipment -VAS 5234-



- Unlock tool -T10006 A-



7.1 Removal

– Disconnect the battery ⇒ Electrical equipment; Rep. Gr. 27 ; Battery - disconnect and connect .

Note

- *Check whether the vehicle has a coded radio. If so, request the anti-theft code before disconnecting the battery earth strap.*
- *When the battery is reconnected, check the operation of the vehicle electrical system (radio, clock and electric door and window locks, etc.) according to the Workshop Manual and/or instructions for use.*

– Place an adequate number of lint-free cloths in the area around the water reservoir, engine and transmission.

– Draw as much brake fluid as possible from the reservoir by using Brake replenishment and bleed equipment -VAS 5234- or -V.A.G 1869/4- .

– Close the clutch cylinder return hose with the Clamp (diam. 25 mm) -3094- .

– Disconnect the clutch cylinder return hose.

– Disconnect the connector of the Brake oil level warning contact -F34- .

– Release the brake lines in the brake master cylinder and close them with the plugs of Repair set of plugs -1H0 698 311 A- .

– Disconnect the vacuum hose from the servo brake.

– Remove the instrument panel. ⇒ Body - internal mountings; Rep. Gr. 70 ; Instrument panel - remove and install .

– Remove heating baffle ⇒ Heating, air conditioning; Rep. Gr. 80 ; Left footwell air duct - remove and install .

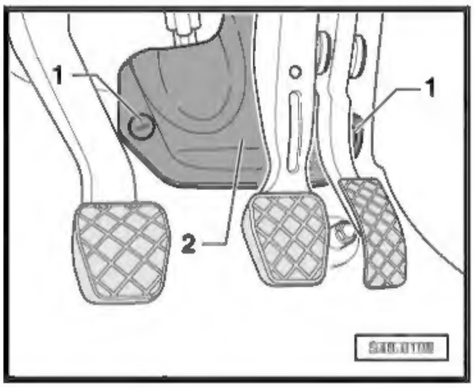
– Loosen the screws -1-.

– Remove cover -2-.

– Disengage the accelerator cable.

– On vehicles with accelerator pedal position sensor, release the connector under the instrument panel.

– Remove the Brake light switch -F- , turning it 45° to the left.



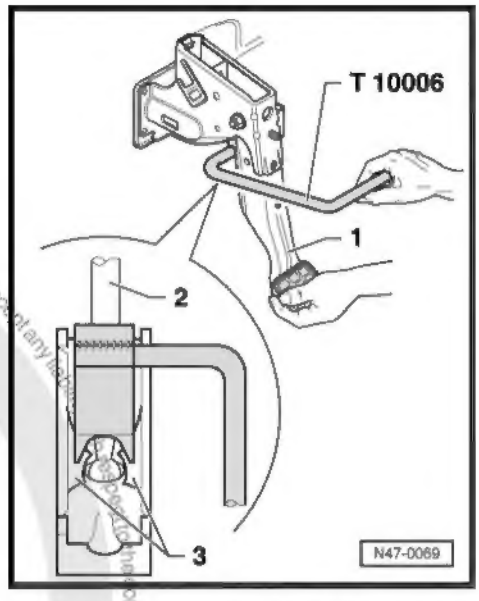
– Then, press and hold the brake pedal towards the servo brake.

1 - Brake pedal

2 - Brake cylinder operating rod

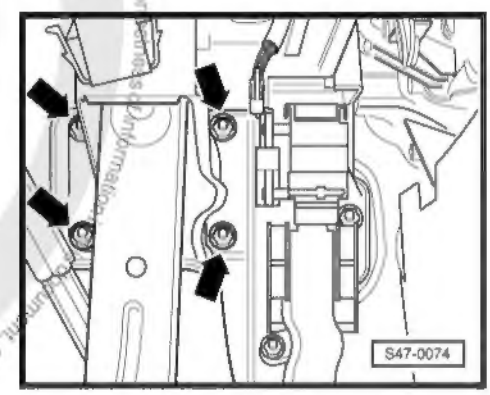
3 - Fastening shoulders

– Position Unlock tool -T10006A- and pull it towards the driver's seat, at the same time hold the brake pedal (at this time, the pedal cannot move backwards). With this, the fastening shoulders -3- of the drive rod's spherical head housing are pressed away from the actuating rod -2-.



– Remove the hexagon nuts -arrows-.

– Uncouple the servo brake with the brake cylinder forward and remove.



7.2 Installation

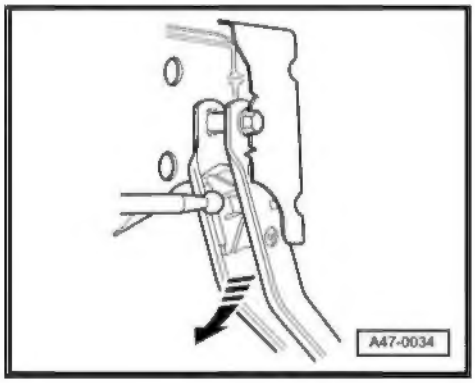
Install by inverting the removal sequence, paying attention to the following:

– Hold the operating rod ball head in front of the housing and press the brake pedal towards the servo brake until the ball head coupling is heard.

– Hexagon nut tightening torque: 28 Nm.

– Adjust the Brake light switch -F- ⇒ page 74 .

– Prior to the installation of the switch, completely remove the rod.



- Insert the switch through the assembly opening, press it against the pedal and fix it by turning it 45° to the right.
- Keep the brake pedal at resting position.
- Engage the connector Brake light switch -F- .
- Check the brake light operation.

After adjusting, check whether the Brake light switch -F- is at the final stop (loose position).

- Bleeding brake system ⇒ page 85 .

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